SCIAMACHY
Operations Change Request
Catalogue
2003-2012

PO-TN-DLR-SH-0036

Issue 1, Rev. 0

30 April 2016

Prepared by

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DLR

Deutsches Zentrum für Luft- und Raumfahrt
Earth Observation Center
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Abbreviations and Acronyms

ADC	Analogue-to-Digital Converter
ANX	Ascending Node Crossing
AOCS	Attitude and Orbit Control System
AOP	AO Instrument Provider
APSM	Aperture Stop Mechanism
ARB	Anomaly Review Board
ASM	Azimuth Scan Mechanism
ATBD	Algorithm Theoretical Basis Document
BCPS	Broadcast Pulse Synchronisation
BIRA	Belgisch Instituut voor Ruimte-Aëronomie
BSSF	Bidirectional Scattering Distribution Function
BU	Binary Unit
CFI	Customer Furnished Item
CMD	Command
CTI	Configurable Transfer Item
DFD	Deutsches Fernerkundungs-Datenzentrum
DLR	Deutsches Zentrum für Luft- und Raumfahrt
DOAS	Differential Optical Absorption Spectroscopy
ECOMA	Existence and Charge State Of Meteoric Smoke Particles in the Middle Atmosphere
ELV	Elevation
ENVISAT	Environmental Satellite
EOC	Earth Observation Center
ESA	European Space Agency
ESM	Elevation Scan Mechanism
ESOC	European Space Operation Centre
FFS	Final Flight States
FFT	Final Flight Timelines
FOCC	Flight Operation Control Centre
FoV	Field of View
FPN	Fixed Pattern Noise
ICU	Instrument Control Unit
ID	Identifier
IFE	Institut für Fernerkundung
IFOV	Instantaneous Field of View
ILOS	Instrument Line-of-Sight
IMF	Institut für Methodik der Fernerkundung
IOM	Instrument Operation Manual
IPY	International Polar Year
IUP-IFE	Institut für Umweltphysik / Institut für Fernerkundung
LC	Leakage Current
LIDAR	Light Detection and Ranging
LLI	Life Limited Item
LOS	Line-of-Sight
MAX-DOAS	Multi Axis DOAS
MCMD	Macrocommand
MO&C	Moon Occultation & Calibration
MoM	Minutes-of-Meeting

MPS	Mission Planning System
NCR	Non-Conformance Report
NCWM	Nadir Calibration Window Mechanism
NDF	Neutral Density Filter
NDFM	Neutral Density Filter Mechanism
NH	Northern Hemisphere
NIST	National Institut of Standards and Technology
NIVR	Nederlands Instituut voor Vliegtuigontwikkeling en Ruimtevaart
NLC	Noctilucent Clouds
NRT	Near-realtime
NSO	Netherlands Space Office
OCR	Operation Change Request
OSDF	Orbit Sequence Definition File
PET	Pixel Exposure Time
PMD	Polarisation Measurement Device
PMTC	Power Mechanism and Thermal Control Unit
QE	Quantum Efficiency
RGT	ROP Generation Tool
RMS	Root Mean Square
ROLO	Robotic Lunar Observatory
ROP	Reference Operation Plan
RTCS	Relative Time Command Sequence
SADDU	SCIAMACHY Algorithm Development and Data Usage
SC	Spacecraft
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SDPU	Science Data Processing Unit
SF	Sun Follower
SFS	Sun Follower System
SH	Southern Hemisphere
SLS	Spectral Line Source
S/N	Signla-to-Noise
SNR	Signal-to-Noise Ratio
SO&C	Sun Occultation & Calibration
SODAP	Switch-on and Data Acquisition Phase
SOR	SCIAMACHY Operations Request
SOST	SCIAMACHY Operations Support Team
SQWG	SCIAMACHY QWG
SRON	SRON Netherlands Institute for Space Research
SSAG	SCIAMACHY Science Advisory Group
TCFoV	Total Clear Field of View
T/L	Timeline
TN	Technical Note
UTC	Universal Time Coordinated
UTLS	Upper Troposphere Lower Stratosphere
WLS	White Light Source
WM	Wait Measurement
WME	Wait Measurement Execution
WSR	Wait Scanner Reset
XNL	Non-Linearity

Reference Documents and Reference Information

- Instrument Operation Manual (IOM), MA-SCIA-0000DO/01, Issue F R1, 16 June 2003 with occasional updates yielding Issue F, Revision 4b (R4b), 01 February 2012
- SCIAMACHY Operations Concept – I. Mission Scenarios, PO-TN-DLR-SH-0001/1, Issue 3, Rev 0, 15 October 2001
- SCIAMACHY Operations Concept – II. Timelines: Generation, Planning & Execution Rules and Reference Timeliness, PO-TN-DLR-SH-0001/2, Issue 3, Rev. 0, 31 October 2001
- SCIAMACHY Operations Concept – III. Instrument States and Onboard Tables (PFM), PO-TN-DLR-SH-0001/3, issue 4, Rev. 4, 09 January 2002
- SCIAMACHY In-Orbit Mission Report, PO-TN-DLR-SH-0034, Issue 1, Rev. 0, 30 April 2016
- SCIAMACHY - Exploring the Changing Earth's Atmosphere, Manfred Gottwald, Heinrich Bovensmann (Eds.), ISBN 978-90-481-9895-5, DOI 10.1007/978-90-481-9896-2, Springer Dordrecht Heidelberg London New York
- SOST website (http://atmos.caf.dlr.de/projects/scops/)

1. Scope and Purpose

This Technical Note (TN) describes the complete suite of approved and implemented SCIAMACHY Operations Change Requests (OCR). After the end of the SCIAMACHY Operations Support Team (SOST) Phase F it will be the master OCR repository.

OCR related information is also provided by other means. OCRs and implementation dates are listed on the SOST websites (http://atmos.caf.dlr.de/projects/scops/) under "Operations Modification". Maintenance of these websites is envisaged for the near future but it is not intended to ensure their availability for the entire period of SCIAMACHY long-term data preservation, i.e. at least 2-3 decades. A subsample of OCR information, however, will be subject to long-term data preservation. This includes OCR identifiers, orbit numbers with implemented OCRs and the purpose of each OCR. This information is stored together with other SCIAMACHY operations and instrument knowhow in the level 1b product. Details of this long-term preservation approach can be found in the TN *SCIAMACHY Operations Long-Term Archiving, PO-TN-DLR-SH-0035, Issue 1, Rev. 0, 30 April 2016*.

The complexity of SCIAMACHY OCRs varied considerably. It ranged from simply modifying only a few measurement parameters, e.g. pixel exposure times, to re-program the instrument to accomplish measurement goals for which it had never been designed originally, e.g. observing the atmosphere of Venus. Therefore the documentation of the OCRs as requested by their authors, the analysis by SOST and the final implementation finally led to quite different levels of detail. Some OCRs required only minor investigations by SOST and the entire OCR procedure did not cover more than 1-2 pages of documentation. Others triggered intense studies and the auxiliary material, usually annexed to the particular OCR, resembled a short TN.

We find it worthwhile to preserve the existing OCR knowledge as much as possible. Since the long-term preservation approach via the level 1b files is not suited for documents with e.g. extended graphics, we feel that listing the OCRs in the form of a TN is the only way to ensure their availability for future SCIAMACHY data users. The current SCIAMACHY Operations Change Request Catalogue has been assembled just for that purpose. It provides for each of the 50 approved and implemented OCRs the complete OCR form including annexes. In the final chapter an overview is given about when and how the various OCRs had been implemented.

2. Operation Change Requests

SOST kept SCIAMACHY’s final flight configurations under strict configuration control. Therefore any change in

- mission scenarios
- state definitions
- timeline definitions

required a formal process. This was achieved via the Operation Change Requests (OCR). OCRs applied to both temporary and permanent changes. OCR implementation was a sequential process between the author(s) of the OCR, the SSAG approving/rejecting the OCR from a science point of view, SOST analysing and finally implementing the OCR and the AOP agencies giving the formal approval. During the mission the OCR mechanism had proven quite successful. From January 2003 to April 2012 50 OCRs had been successfully implemented in total.

The following listing provides each of these 50 OCRs. The obvious gaps between OCR_03 and OCR_05 as well as between OCR_14 and OCR_16 are due to two withdrawn OCRs (OCR_05 and OCR_15).

The corresponding OCR forms have only been edited to obtain a common format and to erase the most obvious editorial issues, e.g. typos. In all other aspects they are identical to the original forms as they had been issued and made available via the SOST website in SCIAMACHY’s phase E.

OCR_01: Reduce Moon Occultation PETs to 1 s

SCIAMACHY	Operation Change Request	OCR No: 01 Issue: A
Title: Reduce Moon Occultation PETs to 1 s		
Description of Request: Change exposure times for moon occultation states (IDs 56 & 57) from 2 s to 1 s in all channels in order to increase the spatial resolution. Change should be effective as soon as possible.		
Originator: S. Noël	Date of Issue: 11 Feb 2003	Signature: e-mail 11.Feb.03, S. Noel
Assessment of SSAG (necessary for requests by scientists): The change is required to get useful trace gas profiles from lunar occultation with an appropriate height resolution. This is underpinned by first lunar occultation data analysis at IFE. As currently (Jan. 2003) the season for lunar occultation with the atmosphere in the dark has started, an as soon as possible implementation is strongly recommended.		
SSAG: H. Bovensmann	Date: 11.2.2003	Signature:
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): The required modification can be implemented by changing the PET table for states 56 and 57. It is proposed to also modify the PETs for state 55 (moon_troposphere) and 54 (moon above atmosphere) as well. These suggested changes have already been discussed with and have been agreed by the OCR originator. All PETs (channels 1-8) shall be changed from 32 to 16. Provided that the approval of the implementation proposal is obtained in time, it is envisaged to generate and submit the associated CTI table prior to March 5th. This should allow the modification to become effective for the next lunar visibility window which runs from March 11th - March 18th.		
SOST: M. Gottwald (ESA, Industry if necessary)	Date: 20-FEB-2003	Signature:e-mail 20.Feb 2003
Approval of Proposed Implementation:		
Originator Approval: S. Noel	Date: 21. Feb.2003	Signature: e-mail 21. Feb.2003
SSAG Approval: H. Bovensmann	Date: 21. Feb.2003	Signature: e-mail 21. Feb.2003
Decision / Approval: The OCR shall be implemented as described in the OCR Analysis.		
DLR Approval: Ch. Chlebek (if necessary NIVR, SPEC)	Date: 27 Feb.2003	Signature: e-mail 27. Feb.2003

Implementation by SOST: PET (LOW and HIGH) for states 54, 55, 56, 57 in all channels changed from old value (2 sec = 32 BCPS) to new value (1 sec = 16 BCPS). CTI generated for validity in orbit 5358 (10.03.2003; 09.23.50) & transferred together with ROP-checklist-file		
SOST E.Krieg	Date:28.Feb. 2003	Signature: e-mail 28.Feb. 2003

OCR_02: Change Nadir Scan w.r.t. TCFoV Anomaly (PR-ID 36)

SCIAMACHY	**Operation Change Request**	OCR No: 02 Issue: A
Title: Change Nadir Scan w.r.t. TCFoV Anomaly (PR-ID 36)		

<u>Description of Request:</u>

As decided during the ARB on 19 Feb 2003 the following changes to all nadir states shall be performed. All angles are given in scanner co-ordinates.

A: Shift centre of scan by 1 deg to the left in order to avoid blocking on right side of TCFoV.
The scan width and scan speed/duration shall be remained.
This change shall be effective for one week only.

B: Shift centre of scan by 0.5 deg to the left (w.r.t. current settings).
Reduce scan width by 1 deg to 31 deg.
Adapt scan speed appropriately to keep scan duration as before (4 s forward, 1 s backward scan).

This change shall be effective directly after the measurements described under “A” have been performed. This will be the new final flight settings.

Originator: S. Noël	Date of Issue: 20 Feb 2003	Signature: e-mail 20.Feb 2003

<u>Assessment of SSAG (necessary for requests by scientists):</u>

The OCR is recommended for implementation to resolve the PR 36 (nadir west pixel blocking).

SSAG: H. Bovensmann	Date: 20 Feb 2003	Signature: e-mail 20.Feb2003

Classification of OCR: D

<u>OCR Analysis (incl. Implementation Option):</u>

A: change value of ESM_basic profile 1 (used for nadir-states only) from -45° to -46°
B.1: change value of ESM_basic profile 1 (used for nadir-states only) from -46° to -45,5°
B.2: change settings in relative profile 2 (used for nadir-states only) to produce a total scan width of 63°
NOTE: this reduction in scan width will affect all nadir states except nadir pointing.
NOTE: the suitability of B2 has to be verified prior to implementation by simulation.
It is planned set up the simulation this week and to prepare the implementation for the next convenient time slot with the sequence as described above in the request.

SOST: E. Krieg (ESA, Industry if necessary)	Date: 2003-03-11	Signature: e-mail 2003-03-11

Approval of Proposed Implementation:

Originator Approval: S. Noel	Date: 2003-03-14	Signature: e-mail 2003-03-14
SSAG Approval: H. Bovensmann	Date: 2003-03-14	Signature: e-mail 2003-03-14

<table>
<tr><td colspan="3">Decision / Approval:

The OCR shall be implemented as described in the OCR Analysis.</td></tr>
<tr><td>DLR Approval: Ch. Chlebek
(if necessary NIVR, SPEC)</td><td>Date: 2003-03-17</td><td>Signature: e-mail 2003-03-17</td></tr>
<tr><td colspan="3">Implementation by SOST:

A: basic profile 1 modified   A: start orbit 5656
B.1: basic profile 1 modified   B: start orbit 5771
B.2: relative profile 2 modified
CTI-files transferred to FOCC 2003-03-20</td></tr>
<tr><td>SOST: E.Krieg</td><td>Date: 2003-03-20</td><td>Signature: e-mail 2003-03-21</td></tr>
</table>

OCR_03: In-Flight Measurement of Channel 8 Non-Linearity

SCIAMACHY	**Operation Change Request**	OCR No: 03 Issue: A
Title: In-Flight Measurement of Channel 8 Non-Linearity		
Description of Request: Additional measurement of the non-linearity (XNL) of the channel 8 detector is required for accurate calibration. XNL will be measured using the detectors' dark signal, so no use of the WLS is made. Measurement will require the use of 60 (sixty) dark current states, similar to the 'standard' 5 dark states, only different in PET. Ten to fourteen orbits (one day) of these measurements are required, preferably close after decontamination. This measurement will claim all available states to ensure accuracy. Measurements should be executed in April 2003 after the execution of the missing SODAP measurements.		
Originator: Q.L. Kleipool / SRON	Date of Issue: 26 Feb 2003	Signature:
Assessment of SSAG (necessary for requests by scientists): The in-flight characterisation of the non-linearity in channel 8 was discussed at last SSAG meeting and the implementation of dedicated measurements was recommended. When executing the measurement, any interference with validation campaigns has to be excluded.		
SSAG: H. Bovensmann	Date: 4.3.2003	Signature:
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): The measurements require to define 60 new states. These states are identical, from a scanner control point of view, to the currently existing dark current states. The PETs and integration times are set such the times provided with the OCR are obtained. State IDs for the 60 new states are all IDs except the presently existing 5 dcc states, dcchm, sos01, sos02, adc01 and limb01. This ensures that t/l 63 can run in each orbit and, if required, also a Sun occultation t/l. The total number of CTI tables to re-configure the instrument still has to be elaborated once the implementation option is accepted. It is expected that the number is so high that one orbit has to be reserved for CTI uploads. The 60 non-linearity states will be embedded in two non-linearity timelines (set 09, t/l 44 and 53) as described in the request. The total duration of both timelines is estimated to be 1039 sec. Thus they fit into the eclipse time window. The non-linearity timelines will start about 200 sec after eclipse start and end 1039 sec later. A realistic estimated implementation date is early May (if state and timeline definition could proceed quickly, an on-board upload end of April would also be possible). Note: a) Since this OCR represents a massive deviation from the nominal operation environment, we still have to discuss with ESOC/ENVISAT that the approach described here is feasible. b) The high number of MCMDs to be issued in CTI upload increases the risk for the MCMD check error to occur again.		

SOST: M. Gottwald (ESA, Industry if necessary)	Date: 17/03/03	Signature: e-mail 17/03/03
Approval of Proposed Implementation:		
Originator Approval: Q. Kleipool	Date:2003-03-18	Signature: e-mail 2003-03-18
SSAG Approval: H. Bovensmann	Date: 2003-03-17	Signature: e-mail 2003-03-17
Decision / Approval: The OCR shall be implemented as described in the OCR Analysis. The following comments (from the e-mail, H. Bovensmann, 2003-03-17) shall be considered: Nevertheless it is very important that the state and timeline settings will be very carefully checked by SOST and SRON before on-board implementation. In addition it has to be checked if external stray-light can be a problem and the orbit phase for execution has to be optimised.		
DLR Approval: Ch. Chlebek (if necessary NIVR, SPEC)	Date:2003-03-18	Signature: e-mail 2003-03-18
Implementation by SOST: - States: onboard configuration (60 new states of dark current type) of parameter tables (CTI_seq_nonlin) generated and CTI-files (244 off) transferred to FOCC for execution of measurements in orbits 6091 to 6109 (April 30th/May 1st). - Timelines: two eclipse timelines in new set 09 defined (t/l 44 & 53) and transferred to FOCC for execution in orbits 6091 to 6109. Schedule alternates between both timelines in consecutive orbits. Each orbit between 6091 and 6109 executes either timelines 63 & 44 or 63 & 53. No other measurements are planned in these orbits.		
SOST: E.Krieg M.Gottwald	Date: 2003-04-04	Signature: e-mail 2003-04-04

OCR_05: Harmonisation of the Monthly Dark Signal Calibration Orbits

<table>
<tr><td>SCIAMACHY</td><td colspan="2">Operation Change Request</td><td>OCR No: 05
Issue: A</td></tr>
<tr><td colspan="4">Title: Harmonisation of the Monthly Dark Signal Calibration Orbits</td></tr>
<tr><td colspan="4"><u>Description of Request:</u>
The currently preferred dark signal calibration method uses five dark states as defined by SRON. These are implemented in the nominal eclipse timelines. For completeness, the monthly dark signal calibration orbits must also use this five dark states approach. Currently the original timelines are still used which only use three of the five defined dark states. This should be changed such that these calibration timelines use blocks with the SRON defined five dark states around the complete orbit.</td></tr>
<tr><td>Originator: Q.L. Kleipool/ SRON</td><td colspan="2">Date of Issue: 26 Feb 2003</td><td>Signature: e-mail 26. Feb. 2003</td></tr>
<tr><td colspan="4"><u>Assessment of SSAG (necessary for requests by scientists):</u>
The analysis of M. Buchwitz on using the new five dark states (“Quintus Darks”) presented at the last SADDU meeting has documented the improvement in CH4 retrieval. It is therefore logically to use these dark states also for the monthly dark signal calibration. The implementation of the proposed change is recommended.</td></tr>
<tr><td>SSAG:
H. Bovensmann</td><td colspan="2">Date:
4.3.2003</td><td>Signature: e-mail 4. March 2003</td></tr>
<tr><td colspan="4">Classification of OCR: D</td></tr>
<tr><td colspan="4"><u>OCR Analysis (incl. Implementation Option):</u>
This OCR requires to modify timelines only (no state modification). Timelines 54,58,59,60,61 and 62 have to be modified such that they include consecutive blocks of 5 dark current states. The duration of each timeline must be maintained (to within a few seconds) in order to fit to the associated orbital phase.
Note that timelines 54, 60, 61 and 62 also include WLS/SLS states. TN 117 claims that the first 115 sec after switching off the SLS and the first 295 sec after switching off the WLS yield data with reduced performance. This might impact the dark current measurements (the total duration of the dark current block is about 210 sec) following a SLS or WLS state. It has to be taken into account in dark current data analysis
Likely implementation date is second half of April. Modified timelines have to be uploaded via the regular SCIAMACHY mission planning input. March planning input has already been delivered to ENVISAT. For the first half of April the planning input is currently in preparation such that the timeline changes might not yet be ready in time for the forthcoming delivery.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF
(ESA, Industry if necessary)</td><td colspan="2">Date: 28/02/2003</td><td>Signature: e-mail 28. Feb 2003</td></tr>
<tr><td colspan="4">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
Q. Kleipool</td><td colspan="2">Date:
2003-03-11</td><td>Signature: e-mail 2003-03-11</td></tr>
</table>

<table>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date:
2003-03-05</td><td>Signature: e-mail 2003-03-05</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>

The OCR shall be implemented as described in the OCR Analysis.</td></tr>
<tr><td>DLR Approval:
(if necessary NIVR, SPEC)</td><td>Date:
2003-03-12</td><td>Signature: e-mail 2003-03-12</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

Timelines 54, 58, 59, 60, 61 and 62 have been modified as described above. Timeline duration was in all cases set such that safe operations is ensured (no timeline overlap or measurement gap violation). The timelines have been converterd to CTI format and have been transferred to FOCC. They will be uploaded in orbit 5711/5712 (April 4th) and executed for the first time in the weekly (t/l 54) and monthly (t/l 58, 59, 60, 61, 62) thereafter.</td></tr>
<tr><td>SOST. M. Gottwald, DLR-IMF</td><td>Date: 13/03/2003</td><td>Signature: e-mail 13/03/2003</td></tr>
</table>

OCR_06: Increase of the Amount of Dark Current Blocks in the Eclipse Timeline

SCIAMACHY	Operation Change Request	OCR No: 06 Issue: A
Title: Increase of the Amount of Dark Current Blocks in the Eclipse Timeline		
Description of Request: Currently there are two blocks of the 5 dark current states in the eclipse timeline. This should be increased to at least three blocks. This is to assure that consolidated level 0 files will contain at least two complete blocks of the five dark current states. Consolidated level 0 files will be sliced at ANX, which in the summer time, will be in the middle of the last dark states block. The first block should be directly at the start of the eclipse timeline. The last block should be the last measurements in the eclipse timeline. The middle block should be somewhere in between the former two. This increase will improve the accuracy to which the dark signal can be determined. The currently foreseen level 1 to level 1 processor calibration of the dark signal will need at least two complete five dark states blocks in each level 0 file.		
Originator: Q.L. Kleipool / SRON	Date of Issue: 26 Feb 2003	Signature: e-mail 26. Feb. 2003
Assessment of SSAG (necessary for requests by scientists): The analysis of M. Buchwitz on using the new five dark states (“Quintus Darks”) presented at the last SADDU meeting has documented the improvement in CH4 retrieval. It is therefore important to assure that these dark current measurement blocks are not sliced and the consolidated L0 product will contain the relevant number of dark current blocks. The implementation of the proposed change is therefore recommended.		
SSAG: H. Bovensmann	Date: 4.3.2003	Signature: e-mail 4. March 2003
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): This OCR requires to modify timelines only (no state modification). Timelines 44 and 53 have to be modified such that in • t/l 44 the last 3 nadir_aurora states are replaced by 5 dark current states at the end of the timeline • t/l 53 the last 6 limb_mesosphere states are replaced by 5 dark current states at the end of the timeline This reduces the time of scientific eclipse measurements by about 250 sec. Note that the scienfic eclipse measurements are thus mainly executed at low to mid latitudes (in winter they extend more north than in summer). Likely implementation date is second half of April. Modified timelines have to be uploaded via the regular SCIAMACHY mission planning input. March planning input has already been delivered to ENVISAT. For the first half of April the planning input is currently in preparation such that the timeline changes might not yet be ready in time for the forthcoming delivery.		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 28/02/2003	Signature: e-mail 28. Feb. 2003
Approval of Proposed Implementation:		

Originator Approval: Q. Kleipool	Date: 2003-03-11	Signature: e-mail 2003-03-11
SSAG Approval: H. Bovensmann	Date: 2003-03-05	Signature: e-mail 2003-03-05
<u>Decision / Approval:</u> The OCR shall be implemented as described in the OCR Analysis.		
DLR Approval: (if necessary NIVR, SPEC)	Date: 2003-03-12	Signature: e-mail 2003-03-12
<u>Implementation by SOST:</u> Timelines 44 and 53 have been modified as described above. Timeline duration was in all cases set such that safe operations is ensured (no timeline overlap or measurement gap violation). The timelines have been converted to CTI format and have been transferred to FOCC. They will be uploaded in orbit 5711 (April 4th) and executed from that time on each orbit in eclipse phase.		
SOST: M. Gottwald, DLR-IMF	Date: 13/03/2003	Signature: e-mail 13/03/2003

OCR_07: Revision of Calibration States 67, 8, 16 and 48

SCIAMACHY	**Operation Change Request**	OCR No: 07 Issue: D

Title: Revision of Calibration States 67, 8, 16 and 48

Description of Request:

Because all the moon states PET's have been changed to 1 second, the originally implemented 2 seconds for the direct dark approach is redundant. Request is to change the PET of two dark current calibration states

Furthermore we want to use the WLS hot-mode dark to correct state 16 and 48, therefore the PET of these states must be equal to the WLS hot mode dark states.

New Pixel Exposure Times and Co-Adding Factors:

State_id: 8.(dark current 5)
Repetitions in state: 8.
State duration: 40 seconds.

Channel:	ch 1a	ch 1b	ch 2a	ch 2b	ch 3	ch 4	ch 5	ch 6	ch 7	ch 8
PET:	5	5	1	1	1	1	1	5	1	1
Co-adding:	1	1	1	1	1	1	1	1	1	1

State_id: 67 (dark current 3).
Repetitions in state: 8.
State duration: 80 seconds.

Channel:	ch 1a	ch 1b	ch 2a	ch 2b	ch 3	ch 4	ch 5	ch 6	ch 7	ch 8
PET:	10	10	10	10	0,125	0,125	10	0,125	2	2
Co-adding:	1	1	1	1	2	2	1	1	1	1

State 16: (NDF monitoring) : channel 6 -> 0,0072 seconds.
No change of co-adding

State 48: (NDF monitoring) : channel 6 -> 0,0072 seconds.
No change of co-adding

Originator: Kleipool / Lichtenberg	Date of Issue:2003-07-07	Signature: e-mail, Q. Kleipool, 2003-07-07
Assessment of SSAG (necessary for requests by scientists):		
SSAG: S. Noel	Date: 2003-07-07	Signature: e-mail, S. Noel, 2003-07-07
Classification of OCR: D		

<table>
<tr><td colspan="3"><u>OCR Analysis (incl. Implementation Option):</u>
a) State ID 8 requires change of PET for channel 6 ; coadding no change (1 CTI)
b) State ID 67 requires change of PET for channels 3, 4, 6; coadding changed (2 CTIs - PET + Coadding 50). By changing coadding table 50 the allocation specific to individual calibration states is maintained and no change to State Index is required.
c) State ID 16 requires change of hot mode channel 6 (1 CTI)
d) State ID 48 requires change of hot mode channel 6 (parameter table modification included in c)

The implementation of this OCR requires only state parameter table changes, no timeline modifications. Thus implementation is decoupled from planning cycles. Implementation will start after having received final approval of OCR.

Upon onboard implementation of this OCR with the upload of the 4 CTI-files the change is considered as permanent. Consequently we will require in parallel at ESOC a change of ERCORMS.</td></tr>
<tr><td>SOST: E. Krieg, SOST-IMF (ESA, Industry if necessary)</td><td>Date: 09/07/2003</td><td>Signature: via e-mail 09/07/2003</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
Q. Kleipool</td><td>Date: 2003-07-10</td><td>Signature: e-mail 2003-07-10</td></tr>
<tr><td>SSAG Approval:
S. Noel</td><td>Date: 2003-07-9</td><td>Signature: e-mail 2003-07-9</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>
The OCR shall be implemented as described in the OCR Analysis.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date: 2003-07-10</td><td>Signature: e-mail 2003-07-10</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>
Onboard initialisation is scheduled for orbit 7267, July 21st at UTC 17:59.
Data rate check for ID08 -> 122326 b/sec = 31,4% ok
Data rate check for ID67 -> 376491 b/sec = 96,5% ok
CTI-files generated 11/07/2003</td></tr>
<tr><td>SOST: E. Krieg, DLR-IMF</td><td>Date: 11/07/2003</td><td>Signature:via e-mail 11/07/2003</td></tr>
</table>

OCR_08: Change of Final Limb Tangent Height Step ("Limb dark") from 150 km to 250 km with Supplement: Re-implementation of State ID27 Limb-Mesosphere

SCIAMACHY	**Operation Change Request**	OCR No: 08 Issue: B

Title: Change of Final Limb Tangent Height Step ("Limb dark") from 150 km to 250 km with Supplement: Re-implementation of State ID27 Limb-Mesosphere

Description of Request:

It is proposed to change the tangent height of the final scan step in *all* Limb states (i.e. limb, limb edarks) from the current value of 150km to 250km. The reason for the change is that the spatial stray light at 250km is around one order of magnitude lower than at 150km. All other parameters of the states should remain unchanged.

To harmonise the dark determination and enable proper monitoring of the darks also the tangent height for *all dark states except for the WLS hot mode dark (state ID 39)* should be set to 250km. All other parameters stay unchanged.

Originator: G. Lichtenberg (SRON)	Date of Issue: 9.05.03	Signature: email 9.05.03

Assessment of SSAG (necessary for requests by scientists):

As shown in IFE-SCIA-JS-20030430 the straylight contribution to the limb background measurements can be reduced drastically when measuring the background at 250 instead of 150 km. It the implementation of the proposed change is therefore recommended.

SSAG: H. Bovensmann	Date: 9.5.2003	Signature: e-mail, 9.5.2003

Classification of OCR:

OCR Analysis (incl. Implementation Option):

Changing the dark current altitude from 150 km to 250 km in the limb states and the dark current states is achieved by changing the basic profile 9 in elevation from the angle equivalent to 150 km to the angle equivalent to 250 km (average -22.51 deg ILOS, i.e. tangent height range 243-264 km, see figures attached). In both state types the transition time prior to the dark current measurement is sufficient to also accommodate an additional mirror movement of 100 km (to be confirmed by simulation).
Since no change in limb state timing is required, no changes are needed w.r.t. timelines. Thus the implementation is independent from the delivery of mission planning inputs to RGT.

Note:
Since elevation basic profile 9 is also used in the limb_mesoshere state (ID 27) to step from 150 km down to about 80 km, a change is required here as well. This modification will introduce a transition from 250 km down to 150 km before the scans down to 80 km will start. In order not to change the duration of the state, the time for the transition will be cut off the measurement phase of the state (small compared to the overall duration of the measurement phase).

OCR Analysis (continued):

Taking into account the required modification of the limb_mesosphere state, implementation is expected within 4 weeks after having received the finally approved OCR. If an early implementation would be required for the dark current measurements, one could only modify basic profile 9 and leave state 27 as it is currently defined. Then, however, the limb_mesosphere measurements would become obsolete.

Re-implementation of state ID27 limb_mesosphere:
In order to start limb_mesosphere measurements from 150km downwards, ESM basic profile 5 (originally used for moon states) will be used to generate the ESM position for 150km tangent height needed for state ID27 as start position. Consequently the definition of this profile in all moon states (note: the basic profile parameters are nominally not used since overwritten by the parameters contained in the START-TIMELINE-MCMD) has to be altered. ESM basic profile 3 will be defined, which provides the identical position parameter but a higher angular rate, since this profile is the back-up for sun-observations. In total 6 CTI-files will be generated.

SOST: M. Gottwald, SOST-IMF	Date: 12/05/2003	Signature: e-mail 12/05/2003

Approval of Proposed Implementation:

Originator Approval: G. Lichtenberg	Date: 2003-05-13	Signature: e-mail 2003-05-13
SSAG Approval: H. Bovensmann S. Noël	Date:2003-05-13 & 2003-07-09 (re-implementation of limb_mesosphere)	Signature: e-mail 2003-05-13 & telephone (re-implementation of limb_mesosphere)

Decision / Approval:

Implementation shall be performed in two steps: modify profile 9 as soon as possible and adapt state 27 later. The loss of limb mesosphere measurements for 4 to 6 weeks is accepted.

DLR Approval: Ch. Chlebek	Date:2003-05-13 & 2003-07-07 (re-implementation of limb_mesosphere)	Signature: e-mail 2003-05-13 & 2003-07-07 (re-implementation of limb_mesosphere)

Implementation by SOST:

In a first step the basic profile 9 will be changed to reflect an altitude of 250 km. The corresponding parameter table is generated and transferred to FOCC 030521 to ensure an upload for orbit 6456.

Step two requires simulation of the modified limb_mesosphere state (planned within the next 2 weeks). In case the results of the simulation confirm feasibility of the modification, the on-board implementation will occur after about 4-6 weeks *(note added July 2003: this solution was not feasible; a different approach as described above has been selected).* The SOST webpage will warn potential users of the limb_mesosphere measurements.

Re-implementation of state ID27 limb_mesosphere:
Onboard implementation as described and approved above is planned for 24th July. The SOST webpage will inform about the exact time when limb_mesosphere measurements will start again at an altitude of 150 km.

SOST: M. Gottwald, E. Krieg, SOST-IMF	Date: 09/07/2003	Signature: via e-mail 09/07/2003

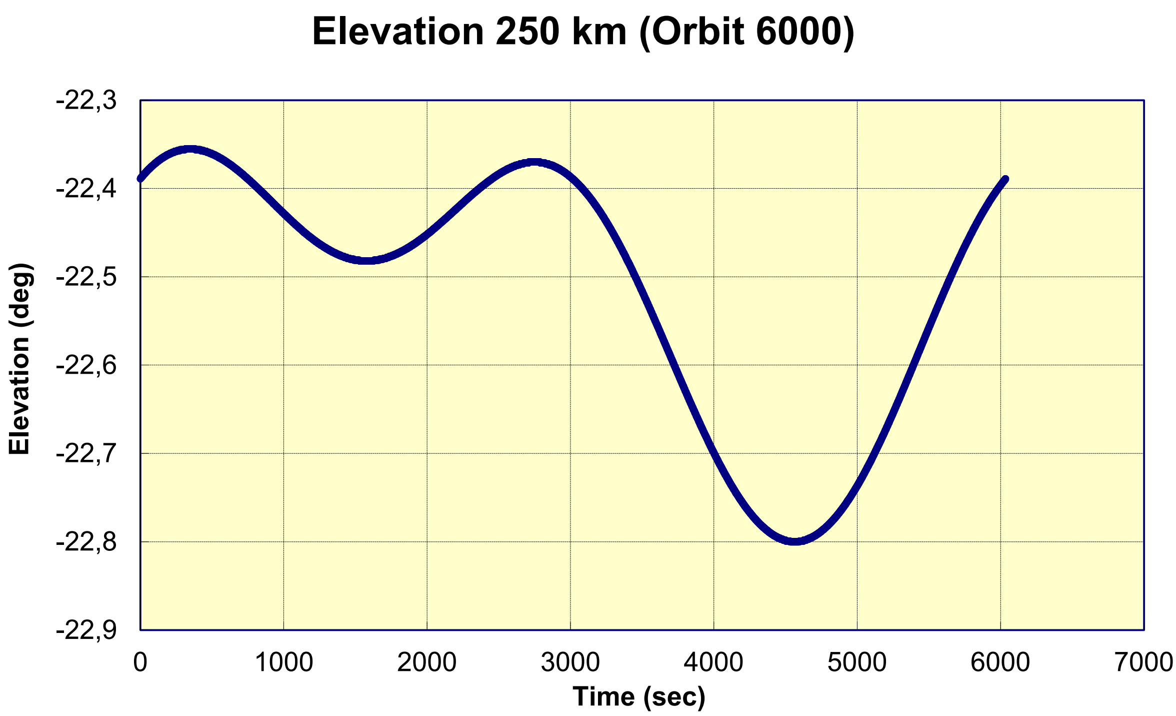

Figure: Elevation equivalent to tangent height altitude = 250 km over a complete orbit

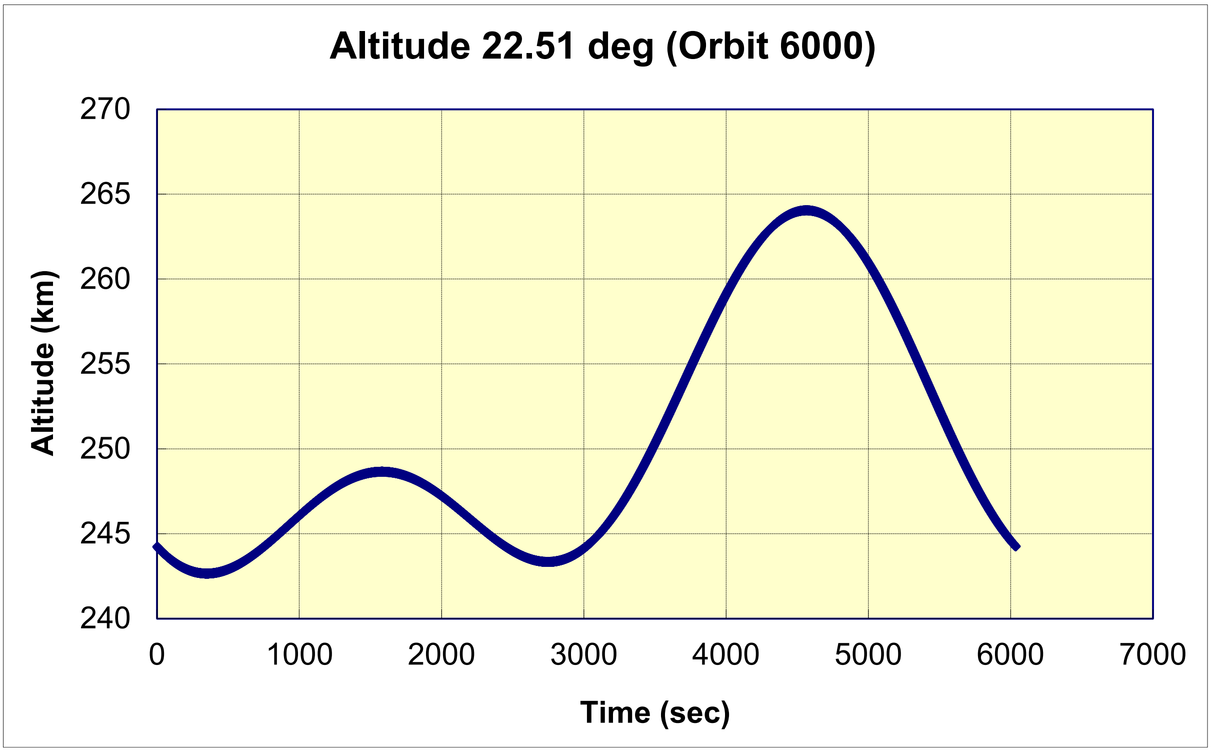

Figure: Tangent altitude equivalent to mean elevation = 22.51 deg over a complete orbit

OCR_09: Repetition of Memory Effect Measurements from SODAP

SCIAMACHY	Operation Change Request	OCR No: 09 Issue: A_5
Title: Repetition of Memory Effect Measurements from SODAP		
Description of Request: It is proposed to repeat the measurements for the verification of the in-flight memory effect. The measurements during SODAP were not sufficient to fulfill the objective, since they were erraneously done in the sunlit part of the orbit. A further investigation leads to the conclusion that the original states WLS_Fast_Out_3, WLS_Fast_Out_4 and WLS_Fast_Out_5 have to be changed. The changes concern PETs and scanner phase duration. A detailed description of the required changes can be found in the attached file "memeffectmsm.pdf".		
Originator: G. Lichtenberg (SRON)	Date of Issue: 7.05.03	Signature: email 7.05.03
Assessment of SSAG (necessary for requests by scientists): As the memory effect already changed on ground by 20 – 40% (TN-SCIA-1000FO/200) and an imperfect knowledge will introducing differential structures of some 10^{-3}, it is recommended to perform the proposed measurements asap. Interferences with validation campaigns should be avoided.		
SSAG: H. Bovensmann	Date: 9.5.03	Signature: e-mail 9.5.03
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): This OCR requires the definition of 3 specific states (WLS_Fast_Out_3/4/5). They are defined similary as the corresponding SODAP states but with the modifications specified in the document *memeffectmsm.pdf*. During the WLS_Fast_out measurements no other measurements (except t/I 63) will be performed. The 3 WLS_Fast_Out states will be planned in two consecutive timelines of set 09. The first executes the sequence WLS_Fast_Out_3/WLS_Fast_Out_4/WLS_Fast_Out_5, the other the reversed sequence WLS_Fast_Out_5/WLS_Fast_Out_4/WLS_Fast_Out_3. The draft timeline definitions are attached. Each timeline will start 750 sec after ENVISAT enters eclipse. This corresponds to an orbital phase of about 0.2 (eclipse start on-ground = 0.0). Given the importance of these measurements, we will schedule the two consecutive measurements twice. WLS usage amounts to 448 sec each, i.e. the LLI budget will increase by 1792 sec (total WLS budget is 25 hrs burning time). Please confirm the number of orbits when approving the OCR. If 4 orbits are considered too risky from a LLI point of view, they will be reduced to 2. Implementation can be ensured for mid July (end of the planning cycle which is presently in preparation). Note that we try to execute these measurements even earlier in the end-of-June timeframe, but calibration and data processing shall currently use the mid July milestone.		

<table>
<tr><td>SOST: M. Gottwald, SOST-IMF</td><td>Date: 12/05/2003</td><td>Signature: via e-mail 12/05/2003</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
G. Lichtenberg</td><td>Date: 2003-05-13</td><td>Signature: e-mail 2003-05-13</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date: 2003-05-13</td><td>Signature: e-mail 2003-05-13</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>

The measurements shall be performed only once to avoid the extra burning time of the WLS. The measurements shall be performed during “Kiruna visible orbits” to enable data delivery by DDS.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date: 2003-05-13 & 2003-06-23/24 (modification)</td><td>Signature: e-mail 2003-05-13 & telecons 2003-06-23/24 (modification)</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

States: State 42,43 & 44 has been defined according to the specification. Setup and clean-up times are identical to the settings of the associated states in SODAP (configuration 6). CTI-files are generated and transferred to FOCC with validity for orbits 6778 and 6779.
The restoration of the final-flight configuration has been also generated and transferred to FOCC with validity from orbit 6780 onwards.
Timelines: Two timelines have been defined in set 09 (t/l 39 & 40) as specified above. CTI-generation and transfer are done.

The planning input for the time period June 17th - July 16th includes the execution of these timelines in orbits 6778 and 6779 (June 17th). These orbits are Kiruna coverage orbits without a SAA passage.

<u>Modification</u>:
Due to occurrence of failure entries during execution of state 42,43 & 44 related to exceeding the data rate limit, the implementation of these states for a repetition will be altered as compared to document “memeffectmsm.pdf” by G. Lichtenberg 07/05/2003 such that:
a. Channels 6,7 & 8 will now be integrated with co-adding 16 in all 3 states
b. Channels 6,7 & 8 will now be integrate with shorter PET of 0.03125sec in state 44 to avoid saturation

The planning input for the time period July 16th – August 16th includes the execution of these measurements in timelines 39 and 49 in orbits 7193 and 7194 (July 16th). These orbits are Kiruna coverage orbits. The CTI-files required will be produced and transferred week 27.</td></tr>
<tr><td>SOST: M. Gottwald, E. Krieg, SOST-IMF</td><td>Date: 25/06/2003</td><td>Signature: via e-mail 26/06/2003</td></tr>
</table>

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RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	42	WLS_Fast_Out_3	709	2,77	2,77	361,35	364,12
2	43	WLS_Fast_Out_4	92506	361,35	364,12	81,35	445,47
3	44	WLS_Fast_Out_5	20825	81,35	445,47	39,35	484,82
4	End of Timeline	End of Timeline	10073	39,35			
5	End of Timeline	End of Timeline	0				
6	End of Timeline	End of Timeline	0				
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62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
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		T/L Cleanup	124113		484,82	0,09	484,91

Timeline 39

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RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	44	WLS_Fast_Out_5	709	2,77	2,77	39,35	42,12
2	43	WLS_Fast_Out_4	10073	39,35	42,12	81,35	123,46
3	42	WLS_Fast_Out_3	20825	81,35	123,46	361,35	484,82
4	End of Timeline	End of Timeline	92506	361,35			
5	End of Timeline	End of Timeline	0				
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64	End of Timeline	End of Timeline	0				
		T/L Cleanup	124113		484,82	0,09	484,91

Timeline 40

OCR_10: Perform WLS Over Diffuser Measurements (State 70, measurement category 19) in Eclipse only

SCIAMACHY	**Operation Change Request**	OCR No: 10 Issue: A
Title: Perform WLS Over Diffuser Measurements (State 70, measurement category 19) in Eclipse only		
Description of Request: WLS over diffuser measurements (state 70, meas.cat. 19) are normally performed on the dayside of the orbit (orbit phase ≈0.87). These measurements are contaminated (up to 50 %) with spatial straylight and therefore cannot be used for monitoring. As example see the plot on the next page. It shows the ratio of a normal WLS over diffuser measurement with one performed in eclipse (orbit phase ≈0.18) during delta SODAP in December 2002. Straylight can be clearly seen in channels 1 to 3 (the deviation in channel 6+ is possibly caused by temperature effects). It is therefore requested to perform WLS over diffuser measurements in eclipse only. From a cautious estimate this should be in the orbit phase from 0.184 to 0.25.		
Originator: Jochen Skupin	Date of Issue: 2003-05-8	Signature: e-mail 2003-05-09
Assessment of SSAG (necessary for requests by scientists): The proposed change is recommended for implemented. The WLS/diffuser measurements on the dayside are currently useless.		
SSAG: H. Bovensmann	Date: 9.5.2003	Signature: e-mail 9.5.2003
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): The definition of timelines 60 and 62 (timeline set 25, monthly calibration) requires update. Timeline 60 (sub-solar window to eclipse start) will be cleared of the calibration lamps over diffuser measurements. Timeline 62 (eclipse start to end) will now also contain the calibration lamps over diffuser measurements (state ID 69 & 70). Timeline 62 also includes the NDFM monitoring states which operate the WLS as well. Therefore it is required to re-shuffle all states using the calibration lamps in order to take care of the time intervals without full performance measurements after a lamp state (SLS: 115 sec, WLS: 295 sec). The resulting modified timelines 60 and 62 are attached. The WLS over diffuser measurement starts 759 sec after t/l start. Since the timeline start will be about 200 sec after ENVISAT enters eclipse and ENVISAT eclipse entry occurs about 475 sec after eclipse start on-ground, the WLS over diffuser measurement corresponds to an orbit phase (eclipse start on-ground = 0.0) of 0.23 Implementation can be ensured for the monthly calibration orbits in July.		

<table>
<tr><td colspan="3">OCR Analysis (continued):

Modification:
Since the orbital phase of the final lwnd measurement in the modified timeline 62 was considered not to be perfect, the implementation option is changed as follows:
a) also modify timeline 61: includes now in addition of the previous two lsc states also the WLS over diffuser state. The timeline ends with a block of dark current states and a few 'filler' dcc states (to adjust t/l duration). Lamp states are executed between orbital phase 0.15 - 0.27
b) t/l 62 executes the states lwnd01 & lwnd02 and the SLS over diffuser. This timeline also ends with blocks of dark current states, including filler dcc states. Lamp states are executed between orbital phase 0.15 - 0.28.
Both t/l 61 and t/l 62 are attached (together with the untouched t/l 60).</td></tr>
<tr><td>SOST: M. Gottwald, SOST-IMF
(ESA, Industry if necessary)</td><td>Date: 12/05/2003 & 15/05/2003</td><td>Signature: via e-mail 12/05/2003 & 15/05/2003</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
J. Skupin</td><td>Date: 20/05/2003</td><td>Signature: via telephone 20/05/2003</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date: 16/05/2003</td><td>Signature: via e-mail 16/05/2003</td></tr>
<tr><td colspan="3">Decision / Approval:

The OCR shall be implemented as described in the OCR Analysis.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date: 2003-05-20</td><td>Signature: e-mail 2003-05-20</td></tr>
<tr><td colspan="3">Implementation by SOST:

Timelines 60, 61 and 62 of set 25 have been modified as described in the attachment. The timelines have been transferred to ESOC 030521 and are included in the mission planning input for the time period June 17th - July 16th for upload (orbit 7151) and execution (orbit 7153/7154, July 13th).</td></tr>
<tr><td>SOST: M. Gottwald, SOST-IMF</td><td>Date: 21/05/2003</td><td>Signature: via e-mail 21/05/2003</td></tr>
</table>

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RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	53	sscp02	709	2,77	2,77	28,46	31,23
2	8	dcc05	7286	28,46	31,23	43,56	74,79
3	26	dcc04	11151	43,56	74,79	33,56	108,35
4	46	dcc01	8591	33,56	108,35	13,56	121,91
5	63	dcc02	3471	13,56	121,91	33,56	155,46
6	67	dcc03	8591	33,56	155,46	83,56	239,02
7	8	dcc05	21391	83,56	239,02	43,56	282,58
8	26	dcc04	11151	43,56	282,58	33,56	316,14
9	46	dcc01	8591	33,56	316,14	13,56	329,70
10	63	dcc02	3471	13,56	329,70	33,56	363,26
11	67	dcc03	8591	33,56	363,26	83,56	446,82
12	8	dcc05	21391	83,56	446,82	43,56	490,38
13	26	dcc04	11151	43,56	490,38	33,56	523,93
14	46	dcc01	8591	33,56	523,93	13,56	537,49
15	63	dcc02	3471	13,56	537,49	33,56	571,05
16	67	dcc03	8591	33,56	571,05	83,56	654,61
17	8	dcc05	21391	83,56	654,61	43,56	698,17
18	26	dcc04	11151	43,56	698,17	33,56	731,73
19	46	dcc01	8591	33,56	731,73	13,56	745,29
20	63	dcc02	3471	13,56	745,29	33,56	778,84
21	67	dcc03	8591	33,56	778,84	83,56	862,40
22	8	dcc05	21391	83,56	862,40	43,56	905,96
23	26	dcc04	11151	43,56	905,96	33,56	939,52
24	46	dcc01	8591	33,56	939,52	13,56	953,08
25	63	dcc02	3471	13,56	953,08	33,56	986,64
26	67	dcc03	8591	33,56	986,64	83,56	1070,20
27	8	dcc05	21391	83,56	1070,20	43,56	1113,75
28	26	dcc04	11151	43,56	1113,75	33,56	1147,31
29	46	dcc01	8591	33,56	1147,31	13,56	1160,87
30	63	dcc02	3471	13,56	1160,87	33,56	1194,43
31	67	dcc03	8591	33,56	1194,43	83,56	1277,99
32	8	dcc05	21391	83,56	1277,99	43,56	1321,55
33	26	dcc04	11151	43,56	1321,55	33,56	1355,11
34	46	dcc01	8591	33,56	1355,11	13,56	1368,66
35	63	dcc02	3471	13,56	1368,66	33,56	1402,22
36	67	dcc03	8591	33,56	1402,22	83,56	1485,78
37	8	dcc05	21391	83,56	1485,78	43,56	1529,34
38	26	dcc04	11151	43,56	1529,34	33,56	1562,90
39	46	dcc01	8591	33,56	1562,90	13,56	1576,46
40	63	dcc02	3471	13,56	1576,46	33,56	1610,02
41	67	dcc03	8591	33,56	1610,02	83,56	1693,57
42	8	dcc05	21391	83,56	1693,57	43,56	1737,13
43	26	dcc04	11151	43,56	1737,13	33,56	1770,69
44	46	dcc01	8591	33,56	1770,69	13,56	1784,25
45	63	dcc02	3471	13,56	1784,25	33,56	1817,81
46	67	dcc03	8591	33,56	1817,81	83,56	1901,37
47	End of Timeline	End of Timeline	21391	83,56			
48	End of Timeline	End of Timeline	0				
49	End of Timeline	End of Timeline	0				
50	End of Timeline	End of Timeline	0				
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60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	486750		1901,37	0,09	1901,46

Timeline 60

H:\scia\timing\timeline_set_25\tl_25_61_03.xls		ecl_beg_ecl_end_cal_monthly_spec_orb2		Table start ID =	3841	Event_type =	n/a
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SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	8	dcc05	709	2,77	2,77	43,56	46,33
2	26	dcc04	11151	43,56	46,33	33,56	79,89
3	46	dcc01	8591	33,56	79,89	13,56	93,45
4	63	dcc02	3471	13,56	93,45	33,56	127,00
5	67	dcc03	8591	33,56	127,00	83,56	210,56
6	59	lsc01	21391	83,56	210,56	21,57	232,14
7	8	dcc05	5523	21,57	232,14	43,56	275,70
8	26	dcc04	11151	43,56	275,70	33,56	309,25
9	46	dcc01	8591	33,56	309,25	13,56	322,81
10	63	dcc02	3471	13,56	322,81	33,56	356,37
11	67	dcc03	8591	33,56	356,37	83,56	439,93
12	70	lwd01	21391	83,56	439,93	90,32	530,25
13	8	dcc05	23122	90,32	530,25	43,56	573,81
14	26	dcc04	11151	43,56	573,81	33,56	607,37
15	46	dcc01	8591	33,56	607,37	13,56	620,93
16	63	dcc02	3471	13,56	620,93	33,56	654,48
17	67	dcc03	8591	33,56	654,48	83,56	738,04
18	8	dcc05	21391	83,56	738,04	43,56	781,60
19	26	dcc04	11151	43,56	781,60	33,56	815,16
20	46	dcc01	8591	33,56	815,16	13,56	828,72
21	63	dcc02	3471	13,56	828,72	33,56	862,28
22	67	dcc03	8591	33,56	862,28	83,56	945,84
23	59	lsc01	21391	83,56	945,84	21,57	967,41
24	8	dcc05	5523	21,57	967,41	43,56	1010,97
25	26	dcc04	11151	43,56	1010,97	33,56	1044,53
26	46	dcc01	8591	33,56	1044,53	13,56	1058,09
27	63	dcc02	3471	13,56	1058,09	33,56	1091,64
28	67	dcc03	8591	33,56	1091,64	83,56	1175,20
29	8	dcc05	21391	83,56	1175,20	43,56	1218,76
30	26	dcc04	11151	43,56	1218,76	33,56	1252,32
31	46	dcc01	8591	33,56	1252,32	13,56	1265,88
32	63	dcc02	3471	13,56	1265,88	33,56	1299,44
33	End of Timeline	End of Timeline	8591	33,56			
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35	End of Timeline	End of Timeline	0				
36	End of Timeline	End of Timeline	0				
37	End of Timeline	End of Timeline	0				
38	End of Timeline	End of Timeline	0				
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62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	332656		1299,44	0,09	1299,53

Timeline 61

H:\scia\timing\timeline_set_25\tl_25_62_03.xls		ecl_beg_ecl_end_cal_monthly_spec_orb3		Table start ID =	3905	Event_type =	n/a
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RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	8	dcc05	709	2,77	2,77	43,56	46,33
2	26	dcc04	11151	43,56	46,33	33,56	79,89
3	46	dcc01	8591	33,56	79,89	13,56	93,45
4	63	dcc02	3471	13,56	93,45	33,56	127,00
5	67	dcc03	8591	33,56	127,00	83,56	210,56
6	69	lsd01	21391	83,56	210,56	89,58	300,14
7	8	dcc05	22932	89,58	300,14	43,56	343,70
8	26	dcc04	11151	43,56	343,70	33,56	377,26
9	46	dcc01	8591	33,56	377,26	13,56	390,82
10	63	dcc02	3471	13,56	390,82	33,56	424,38
11	67	dcc03	8591	33,56	424,38	83,56	507,93
12	39	dcchm	21391	83,56	507,93	21,26	529,19
13	16	lwnd02	5442	21,26	529,19	22,32	551,51
14	8	dcc05	5713	22,32	551,51	43,56	595,07
15	26	dcc04	11151	43,56	595,07	33,56	628,63
16	46	dcc01	8591	33,56	628,63	13,56	642,18
17	63	dcc02	3471	13,56	642,18	33,56	675,74
18	67	dcc03	8591	33,56	675,74	83,56	759,30
19	8	dcc05	21391	83,56	759,30	43,56	802,86
20	26	dcc04	11151	43,56	802,86	33,56	836,42
21	46	dcc01	8591	33,56	836,42	13,56	849,98
22	63	dcc02	3471	13,56	849,98	33,56	883,54
23	67	dcc03	8591	33,56	883,54	83,56	967,09
24	39	dcchm	21391	83,56	967,09	21,26	988,35
25	48	lwnd01	5442	21,26	988,35	23,35	1011,70
26	8	dcc05	5977	23,35	1011,70	43,56	1055,26
27	26	dcc04	11151	43,56	1055,26	33,56	1088,82
28	46	dcc01	8591	33,56	1088,82	13,56	1102,38
29	63	dcc02	3471	13,56	1102,38	33,56	1135,93
30	67	dcc03	8591	33,56	1135,93	83,56	1219,49
31	8	dcc05	21391	83,56	1219,49	43,56	1263,05
32	26	dcc04	11151	43,56	1263,05	33,56	1296,61
33	End of Timeline	End of Timeline	8591	33,56			
34	End of Timeline	End of Timeline	0				
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46	End of Timeline	End of Timeline	0				
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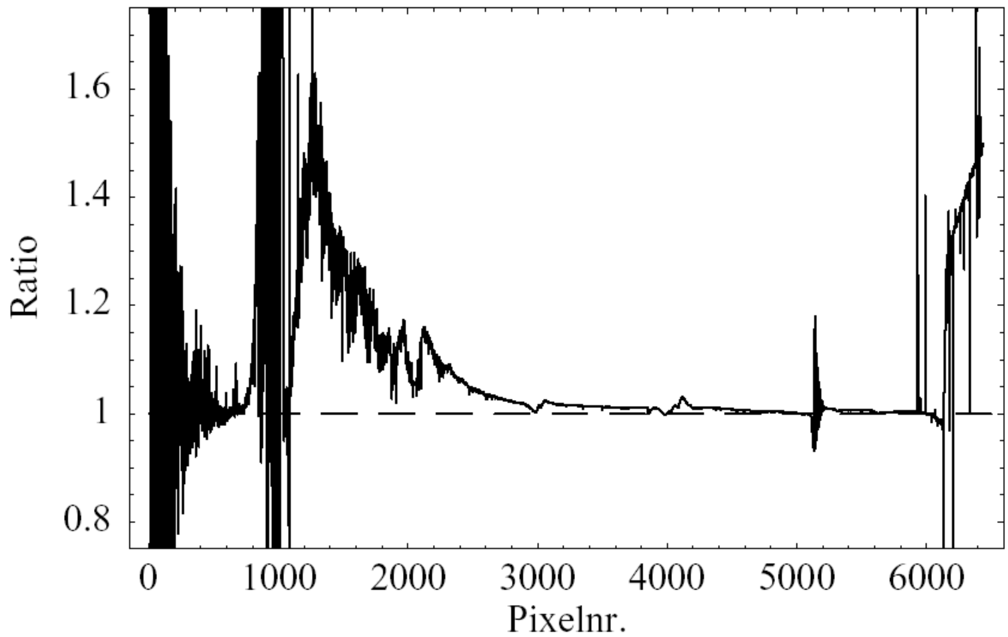
60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	331932		1296,61	0,09	1296,70

Timeline 62

Ratio of WLS over diffuser measurements on dayside (orbit phase ≈0.87) and in eclipse (orbit phase ≈0.18), channel 2 ordered by wavelength



OCR_11: Improvement of Limb/Nadir Matching

SCIAMACHY	**Operation Change Request**	OCR No: 11 Issue: A

Title: Improvement of Limb/Nadir Matching

Description of Request:

It is proposed to improve the limb/nadir matching by skipping the last 4 horizontal scans in each limb state. This will lead to center the limb ground pixels (ILOS tangent hight 0 km at state start and 100 km at state stop) in the matching nadir pixels. The resulting maximum limb altitude will be about 92.9 km. Details of the proposed approach can be found in the attached technical note.

Skipping 3 or 5 horizontal scans would also be possible but centering the limb pixels in the nadir pixels is not as good as in the proposed solution or the maximum limb altitude would be too low.

We propose a two-step implementation approach:

a) At the beginning of the next planning cycle, a 2 day test phase shall execute timelines with the modified limb states. Quick analysis of these measurements enables us to ensure that nadir and limb states are executed at the correct orbital phase (note that the reduced limb duration causes all timelines with limb states to change; thus the assignement of nadir and limb states to the appropriate location in a timeline, equivalent to the correct orbital phase, has to be ensured). In case no e.g. saturation is observed, these test timelines will become the operational timelines, otherwise the test timelines have to be modified. For step a) the re-definition of 8 timelines only is required.
b) Implement the timelines defined in step a) plus all remaining timelines as the timelines for nominal operations. This can be done for the planning cycle succeeding the one in step a).

The 2-day test is considered to provide supplemental information as it allows to detect potential inconsistencies in timeline definition up to a certain degree which can then be corrected for the definition of the operational timelines. No scientific measurement time is lost since the test timelines are equivalent to those intended to be used in nominal operations.

Originator: M. Gottwald, DLR-IMF	Date of Issue: 21/07/2003	Signature: via e-mail 21/07/2003

Assessment of SSAG (necessary for requests by scientists):

As the current limb-nadir matching is not optimal for a combined retrieval of tropospheric columns directly from limb-nadir measurements (see also TN on Limb/Nadir Matching from 18.7.2003) it is recommended to perform a test (step a) with improved state parameter setting.

The final implementation needs to take into account the evaluation of the data from the test phase, some theoretical RTM investigations, investigations on the impact of the loss of mesospheric measurements and the formal approval of the SSAG.

SSAG: H. Bovensmann	Date: 23.7.2003	Signature: via e-mail 23.7.2003

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

Implementation of the limb/nadir matching improvement proposal requires the modification of final flight states and timelines.

States: The Scanner State tables of the limb states have to be changed. In addition State Duration is modified.
Timelines: For the operational implementation all timelines executing a limb state need re-definition. This impacts timelines 01, 02, 15-42 (all sub-IDs), 47-52, 55, 56 of timeline sets 25, 26, 29, 30. Since it involves almost entire timeline sets, the final flight set IDs have to change as well. They will become set IDs 31-36 (an option to use 01-06 needs further tests with ESOC and is still tbc - however for the implementation of this OCR this is irrelevant). The 2-day test needs implementation of 8 timelines (01, 02, 47-52) in set 09.

If approval of the OCR can be achieved very quickly (23/07/2003), it is possible to include the 2-day test in the planning input which is due to be submitted to ENVISAT by 25/07/2003. Then the test would be executed in the second half of August. Note that the decontamination at the same time would not endanger the test goal. Operational implementation of the modified timelines and states could then be done beginning of October - provided that the test confirms the selected approach. Otherwise implementation would shift by 1 cycle and the nominal measurements would be obtained with an improved limb/nadir matching from about November onwards.

SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 21/07/2003	Signature: via e-mail 21/07/2003

Approval of Proposed Implementation:

Originator Approval: M. Gottwald, DLR-IMF	Date: 23/07/2003	Signature: via e-mail 23/07/2003
SSAG Approval: H. Bovensmann, IFE	Date:23.07.2003	Signature: via e-mail 23.7.2003

Decision / Approval (Step 1):

The proposed implementation for step a) should be implemented for the test phase of 2 days.

DLR Approval: Ch. Chlebek	Date: 2003-07-23	Signature: e-mail 2003-07-23

SSAG Approval of Proposed Implementation (Step 2):

The test to improve the limb/nadir matching was successfully executed in orbits 7862-7889. Measurement data analysis confirms the correct definition and execution of states and timelines. After consultation of scientists working on mesospheric retrieval, the impact of the optimised limb-nadir sequence on the coverage of the mesosphere (now only up to 93 km) is judged as acceptable. The implementation of step b) is therefore recommended. Before final implementation it has to be assured with data processing that the modified states will be nominally processed.

Originator Approval:	Date:	Signature:
SSAG Approval: H. Bovensmann	Date: 17.9.2003	Signature: e-mail 17.9.2003

<table>
<tr><td colspan="3"><u>Decision / Approval (Step 2):</u>

DJO could process data measured during step1 from L0 to L1b with the NRT version 4.03. Step 2 shall be implemented.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date:
2003-09-22</td><td>Signature:
e-mail 2003-09-22</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

Step 1:
The limb states with wide swath are reduced in duration by skipping the last 4 horizontal scans (note that the dark current measurement at an altitude of 250 km is unchanged). For the test only wide swath states are required since only these timelines will be executed. This reduces the number of CTI uploads. In total 6 Scanner State and 6 State Duration CTIs will be generated.
Test timelines are defined in set 09. The test timelines concern IDs 01, 02, 47-52. The OSDF for the planning cycle August 16 - October 2 will include 2 days running these test timelines. The test timelines will execute routine measurements on the dayside of the orbit, i.e. no scientific data is lost. The test will be executed while the warm-up phase of the long decontamination is running.

The CTI table and timeline loads will be such that the test timelines will run between orbits 7633-7660 (August 16-18).

Step 2:
The limb states, both for wide and small swath, have been modified as required. This resulted in 12 Scanner State and 12 State Duration CTIs. These 24 CTI files are considered permanent and will become part of ERCORMS.
All final flight timelines of set 25 were re-generated and assigned to the new final flight timeline set 31 (FFT_031015).

The CTI tables and timelines of set 31 will be uploaded at the beginning of orbit 8489 (October 15). From that date onwards the limb/nadir matching will be improved as required in OCR 11.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 23/07/2003 & 24/09/03</td><td>Signature: via e-mail
23/07/2003 & 24/09/03</td></tr>
</table>

OCR_12: Improvement of Limb/Nadir Matching in Early Orbit Phase

SCIAMACHY	**Operation Change Request**	OCR No: 12 Issue: A
Title: Improvement of Limb/Nadir Matching in Early Orbit Phase		

Description of Request:

It is proposed to improve the limb/nadir matching in the early orbit phase by modifying the first 3 nadir states in the timeline which starts immediately after the SO&C window. With the implementation of the modified limb scans (OCR 11) the limb/nadir matching is improved such that the resulting limb pixel (as defined by state start/stop tangent heights) falls into the center of the matching nadir pixel. This occurs whenever limb and nadir state are separated by about 429 sec, i.e. the limb states have a duration of 55.87 sec and the nadir states of 68.56 sec.

At the beginning of the timelines after the SO&C window 3 nadir states have a longer duration of 83.56 sec due to the requirement to have at least 8 readouts and the Pixel Exposure Time of 10 sec in channel 1. This causes the separation of limb and nadir states (nad04 & nad05) to be > 429 sec, i.e. the limb/nadir matching is not as good as for the states from nad06 onwards. In summer, the nadir pixels nad04 & nad05 are geolocated in the polar region while in winter they occur over mid-Europe. In order to achieve a good limb/nadir matching also for these nadir states it is proposed here to modify the separation between the early limb and nadir states in a timeline. This can be done in three ways:

a) Replace nadir states nad01, nad02, nad03 (see attached t/l example) by state nad04. State nad04 has the required duration of 68.56 sec. The PETs of nad01 - nad04 are listed in the attachment.
b) Reduce largest PET in nad01 & nad02 to 5 sec and number of readouts in nad03. Then a measurement duration of 65 sec can be achieved leading to a total state duration of 68.56 sec.
c) Reduce measurement duration in states nad01 - nad03 to 60 sec or 70 sec. This is equivalent to reduce the number of readouts.

All options impact the S/N ratio in the first 3 nadir states of a timeline. Option a) would be the preferred one since

- it only requires modification of a subset of timelines from set 31 (note: in case state duration of nad01 - nad03 would be changed all timelines including these states would need re-definition)
- leaves nad01 - nad03 untouched which are also used at the end of the illuminated part of the orbit (where limb/nadir matching does no longer exist)
- leaves nad09 (calls PET table of nad01) untouched which is used in the eclipse phase

Important note: The options above have to be discussed by retrieval experts. If option b) or c) would be selected, these experts have to specify the PET and co-adding settings or the required measurement duration (to be as close as possible to 65 sec).

<table>
<tr><td colspan="3">
<u>Description of Request (continued):</u>

In the northern hemisphere the total nadir coverage would be reduced by 45 sec while over the southern hemisphere an additional nadir state might be added at the end of a timeline.

If the OCR is approved, a two-step implementation approach as in OCR 11 is required:
c) At the beginning of the next planning cycle, a 2 day test phase shall execute timelines with the modified nadir sequence. Quick analysis of these measurements enables us to ensure that nadir and limb states are executed at the correct orbital phase. In case no e.g. saturation is observed, these test timelines will become the operational timelines, otherwise the test timelines have to be modified.
d) Implement the timelines defined in step a) plus all remaining timelines as the timelines for nominal operations. This can be done for the planning cycle succeeding the one in step a).

The 2-day test is considered to provide supplemental information as it allows to detect potential inconsistencies in timeline definition up to a certain degree which can then be corrected for the definition of the operational timelines. No scientific measurement time is lost since the test timelines are equivalent to those intended to be used in nominal operations.
</td></tr>
<tr><td>Originator: M. Gottwald, DLR-IMF</td><td>Date of Issue: 09/10/2003</td><td>Signature: via e-mail 09/10/2003</td></tr>
<tr><td colspan="3">
<u>Assessment of SSAG (necessary for requests by scientists):</u>

The OCR was discussed at the 29. SSAG. It is recommended to replace nad01-03 with nad04 in the NH <u>and in the SH</u> to improve the limb-nadir matching in NH and in parallel to improve horizontal resolution in SH and NH. It was explicitly stated that the loss in SNR is acceptable.
</td></tr>
<tr><td>SSAG:
H. Bovensmann</td><td></td><td>Signature:
29. SSAG, MoM</td></tr>
<tr><td colspan="3">Classification of OCR: D</td></tr>
</table>

OCR Analysis (incl. Implementation Option):

The option to replace nadir states nad01 - nad03 by another nadir state is considered to be the desired implementation option. It requires the modification of timelines only.

Note that at the time of issue of this OCR, the nadir state selected to replace nad01 - nad03 was nad04. Since then OCR 15 has been submitted which asks for a higher spatial resolution in channel 3 / cluster 15 (30 km × 30 km for NO_2 between 60N-60S). In order not to be forced to modify OCR 12 driven changes when implementing OCR 15 at a later date, it was decided between SOST and SSAG (telecon Bovensmann/Noël/Gottwald, 19/02/2004) to use nad05 instead of nad04 and also replace nad04 by nad05. The loss in SNR is considered to be acceptable.

Another modification of the originally described implementation option is the extension of nad01 - nad03 replacement onto the southern hemisphere. Thus not only all timelines to be executed immediately after the SO&C window need to be changed, but also those which start at the sub-solar window or after the MO&C window. Therefore a new timeline set 32 for nominal measurements will be defined. In the proposed 2-day test, implementation of only the most frequently used timelines (47-52) is planned.

It is expected that the test will run at the start of the next planning cycle (April 15 - May 15). Upon successful timeline verification, the full nominal timeline set can be generated and submitted to ENVISAT such that nominal operations will use it from mid May onwards.

Note:
If definition of the test timelines shows that the orbital positions of states in a timeline do not change significantly, the test could be omitted. This will be discussed within SOST and project management as soon as the timeline definition is finished.

SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 19/02/2004	Signature: via e-mail 19/02/2004

Approval of Proposed Implementation:

Originator Approval:	Date:	Signature:
SSAG Approval: H. Bovensmann	Date: 19.2.2004	Signature: via e-mail 19.2.2004

Decision / Approval:

The implementation as proposed in the OCR analysis is approved. It is recommended that data processing checks that the test orbits are processed nominally.

DLR Approval: Ch. Chlebek	Date: 2004-02-19	Signature: e-mail, 2004-02-19

Implementation by SOST: Note: During timeline definition a few states shifted in orbital position such that an exchange was required. Therefore our actual implementation of OCR12 includes the test phase. The implementation of OCR12 is done in 2 steps. Only timelines are affected. Step 1 (test phase): Test timelines 47-52 are defined in the test timeline set 9. In all test timelines the nadir states nad01-nad05 are replaced by nadir state nad05 as described above. The test timelines will be submitted to ESOC in preparation of the April 15 - May 15 planning cycle. In this period a 2 day test phase (orbits 11108-11135, April 15/16) will execute the modified timelines. Quick analysis of the NRT products shall prove that timeline definitions are correct (no saturation, etc.). Step 2 (nominal operations): All timelines of timeline set 31 are regenerated in the new timeline set 32 for nominal operations. In all timelines the nadir states nad01-nad04 are replaced by nadir state nad05. Since duration of nad05 is shorter than duration of nad01-nad03, it is required to define 6 more moon-related timelines in order to cover the entire variability of moon-related orbital phase intervals. Timeline set 32 consist of 106 timelines in total. Timeline set 32 will be submitted to ESOC for the planning cycle starting May 22. Upload is currently foreseen on May 22 (approx. orbit 11638).		
SOST: M. Gottwald, DLR-IMF	Date: 08/03/2004	Signature: via e-mail 08/03/2004

State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)
		T/L setup		
1	29	limb02	709	2,77
2	29	limb02	14303	55,87
3	29	limb02	14303	55,87
4	29	limb02	14303	55,87
5	1	nad01	14303	55,87
6	30	limb03	21392	83,56
7	2	nad02	14303	55,87
8	30	limb03	21392	83,56
9	3	nad03	14303	55,87
10	31	limb04	21392	83,56
11	4	nad04	14303	55,87
12	32	limb05	17551	68,56
13	4	nad04	14303	55,87
14	32	limb05	17551	68,56
15	5	nad05	14303	55,87
16	32	limb05	17551	68,56
17	6	nad06	14303	55,87
18	32	limb05	17551	68,56
19	6	nad06	14303	55,87
20	32	limb05	17551	68,56
21	6	nad06	14303	55,87
22	32	limb05	17551	68,56
23	6	nad06	14303	55,87
24	32	limb05	17551	68,56
25	6	nad06	14303	55,87

Fig. 1: Part of timeline 47 showing the limb/nadir matching at the start of the timeline together with the imperfectly matching nadir states nad04 & nad05

EXPOSURE PARAMETERS (sec)												
State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	corresponding PET/Coadd-table
1	Low	10,00000	10,00000	10,00000	10,00000	1,00000	1,00000	10,00000	5,00000	1,00000	1,00000	N1
	High	10,00000	10,00000	10,00000	10,00000	1,00000	1,00000	10,00000	5,00000	1,00000	1,00000	N1
2	Low	10,00000	1,00000	1,00000	1,00000	1,00000	1,00000	1,00000	0,50000	1,00000	1,00000	N2
	High	10,00000	1,00000	1,00000	1,00000	1,00000	1,00000	1,00000	0,50000	1,00000	1,00000	N2
3	Low	5,00000	1,00000	1,00000	1,00000	0,25000	0,25000	0,50000	0,25000	1,00000	1,00000	N3
	High	5,00000	1,00000	1,00000	1,00000	0,25000	0,25000	0,50000	0,25000	1,00000	1,00000	N3
4	Low	1,00000	1,00000	0,50000	1,00000	0,25000	0,12500	0,50000	0,25000	1,00000	1,00000	N4
	High	1,00000	1,00000	0,50000	1,00000	0,25000	0,12500	0,50000	0,25000	1,00000	1,00000	N4

Fig. 2: Pixel Exposure Times in sec for the nadir states nad01 (table N1) - nad04

OCR_13: Vertical Azimuth Alignment in Limb Viewing Geometry

SCIAMACHY	**Operation Change Request**	OCR No: 13 Issue: B
Title: Vertical Azimuth Alignment in Limb Viewing Geometry		
Description of Request: To have azimuthal scanning modified so that the “checkerboard” pattern is eliminated and the azimuth range sampled on odd and even elevation steps match. This will allow the trace gas retrieval scientists to co-add spectra from the different azimuths of the same elevation step to improve signal to noise without having to account for azimuthal gradients with the current azimuthally-asymmetric limb scanning strategy. The instrument shall be operated with small swath width (no azimuth scanning during limb) during a day (or less) in each polar winter (e.g. Jan ~5th, Aug ~10th). In this way, It could be demonstrated how much of a difference it makes to the profile retrievals of photochemically active species, like OCIO in particular. Because the inclination of the orbit is +9 rather than -9 off true polar, there is no sunlight in the southern polar regions until later in the (austral) winter, so the ideal day in the south is later into the winter season than in the north. Fortunately, the vortex persists longer in the south.		
Originator: Christopher Sioris	Date of Issue: 2004-02-19	Signature: e-mail, C. Sioris, 2004-02-19
Assessment of SSAG (necessary for requests by scientists): The investigation of implementation options is recommended, as the described effect might be a dominating error source of the photochemically active species NO2, BrO and OCIO in case of horizontal gradients. The proposed change will allow to investigate the effect on limb products in a quantitative way.		
SSAG: H. Bovensmann	Date: 3.3.2004	Signature: e-mail, H. Bovensmann, 4.3.2004
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): Operation with small swath width is part of the nominally defined mission scenarios. No state modifications are necessary. Around August 10^{th} SCIAMACHY will be operated for 1 day (14 orbits) running timelines with alternating limb/nadir small swath width states only. The associated timelines will be defined after the new timeline set 32 (OCR 12, wide swath = standard swath) has been uploaded and verified. This will occur end of June/early July. Note that during the 14 orbits also nadir states will be operated with small swath width. The second occasion with small swath width will be planned around January 5^{th}, 2005 with an identical number of orbits.		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 15/03/2004	Signature: via e-mail 15/03/2004
Approval of Proposed Implementation:		

Originator Approval: C. Sioris	Date: 2004-03-16	Signature: e-mail, C. Sioris, 2004-03-16
SSAG Approval: H. Bovensmann	Date:2004-03-16	Signature: e-mail, H. Bovensmann, 2004-03-16
<u>Decision / Approval:</u> OCR shall be implemented as proposed by SOST.		
DLR Approval: Ch. Chlebek	Date:2004-03-16	Signature: e-mail, Ch. Chlebek, 2004-03-16
<u>Implementation by SOST:</u> 8 small swath width timelines (1,2,47-52) are defined in set 33 (see note below). They are sufficient to cover all 14 orbits on August 10th (orbits 12782-12795). The timelines will be provided to ENVISAT in preparation of the planning cycle which will run from July 22nd to August 22nd. On January 5th, 2005, the same measurements will be repeated (orbits 14901-14914). Note that this date might require finetuning in case another long decontamination will be planned around the late December/early January time period. Note: Since OCR_17, which requires a new timeline set, was under development when implementing OCR_13 it was decided to generate the small swath width timelines used here in set 09 until a final flight timeline set for all small swath width timelines can be implemented.		
SOST: M. Gottwald, DLR-IMF	Date: 03/05/2004	Signature: via e-mail 03/05/2004

OCR_14: Doubling of the Vertical Sampling in Limb Scattering Mode

<table>
<tr><td colspan="2" rowspan="2"></td><td rowspan="2">Operation Change Request</td><td>OCR No: 14</td></tr>
<tr><td>Issue: A</td></tr>
<tr><td colspan="4">Title: Doubling of the Vertical Sampling in Limb Scattering Mode</td></tr>
<tr><td colspan="4"><u>Description of Request:</u>
That the elevation step size be reduced by a factor of 2 from ~3.25 km to ~1.6 km. This will improve precision and/or vertical resolution in the troposphere and stratosphere. Simple co-addition of adjacent elevation steps leads to an improvement of square root of 2 for shot noise limited absorbers.
I suggest that the lower limit of the scan range remain constant and that the upper altitude limit of the scan be halved (from ~100 to ~50 km). This request need not permanently replace the present vertical sampling. If this request is honoured for one orbit the originator would satisfied.</td></tr>
<tr><td>Originator: Christopher Sioris</td><td colspan="2">Date of Issue: Feb. 2nd, 2004</td><td>Signature: e-mail, C. Sioris 2004-02-02</td></tr>
<tr><td colspan="4"><u>Assessment of SSAG (necessary for requests by scientists):</u>
The change is recommended by the SSAG.</td></tr>
<tr><td>SSAG:</td><td colspan="2">Date: 2004-02-11</td><td>Signature: 29.SSAG, MoM</td></tr>
<tr><td colspan="4">Classification of OCR: D</td></tr>
<tr><td colspan="4"><u>OCR Analysis (incl. Implementation Option):</u>
Implementation of the reduced vertical stepsize will be done as a special mesurement only by modifying the scanner state table of the wide swath limb states. The modified CTI tables will be sent to ESOC for uplink as soon they have been generated. Since no timeline changes are required it allows to decouple special measurement implementation from planning cycles.
We propose to execute the special measurements for a full day (14 orbits instead of only 1 - please confirm) in order to ensure availability of measurement data (both in NRT and offline). After special measurement completion the nominal limb settings with about 3 km vertical stepsize will be re-established.
If approval of the OCR can be achieved quickly it is expected to run the special measurements in the second half of March/early April timeframe.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)</td><td colspan="2">Date: 18/02/2004</td><td>Signature: via e-mail 18/02/2004</td></tr>
<tr><td colspan="4">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval: Ch. Sioris</td><td colspan="2">Date:2004-02-18</td><td>Signature: e-mail, Ch. Sioris, 2004-02-18</td></tr>
<tr><td>SSAG Approval: H. Bovensmann</td><td colspan="2">Date:3.3.2004</td><td>Signature: e-mail,H. Bovensmann, 4.3.2004</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Decision / Approval:</u>

The proposed implementation of 14 orbits measurements with reduced step size in Limb as described by DLR SOST (see: OCR analysis) shall be performed.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date:
2004-03-03</td><td>Signature:
e-mail, Ch. Chlebek, 2004-03-03</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

The execution of the 6 nominal limb-states 28 to 33 is modified by
a) changing the elevation step width to 1.5 km by setting the rel_prof factor for rel_prof1 to '3'
b) lifting the tangential height of the first set from -3 km below the horizon to approx. +10km above the horizon by setting in bas_prof 2 the value for ELV to -0.234943 rad = -13.4612deg thereby producing readings approx. between 10 km and 57 km altitude (this additional feature has been discussed with SSAG - H. Bovensmann and is agreed).

The execution of the special operation is scheduled for orbits 10767 (March 22, 06:21:00 UTC) to 10783 (March 23, 10:51:00 UTC) for 17 orbits total to obtain orbits covering the full Arabian peninsula and 3 orbits over the Sahara.

Note: After having implemented step b) it was realized that lifting the start altitude might not be the preferred option. Since the associated CTI tables were already ingested into the ENVISAT mission planning system it was decided (telecon Krieg/Bovensmann/Chlebek/Gottwald, 08/03/2004) to add 14 orbits where the limb vertical step size is reduced to 1.5 km (step a) above) but the start altitude remains at -3 km as in the nominal limb scans. These measurements will be executed from orbit 10797 (March 24, 08:39:00 UTC) to 10810 (March 25, 08:07:00 UTC).</td></tr>
<tr><td>SOST
DLR-IMF E.Krieg</td><td>Date:
08.03.2004</td><td>Signature:
e-mail 08.03.2004</td></tr>
</table>

OCR_16: 2004 Venus Transit Observations by SCIAMACHY

SCIAMACHY	**Operation Change Request**	OCR No: 16 Issue: A

Title: 2004 Venus Transit Observations by SCIAMACHY

Description of Request:

Venus will transit the Sun from 5h 6m 30.5s to 11h 32m 56.0s UTC on June 8, 2004. It is requested that on all orbits from 0h to 16h UTC on June 8, 2004 SCIAMACHY obtain a minimum of 10 minutes of solar diffuser observations per orbit. This would most conveniently be done during the onset of the daylit portion of each orbit, but the actual time of acquisition is not critical to the science requirements.

Originator: Kelly Chance	Date of Issue: February 25,2004	Signature: e-mail, K. Chance, 2004-02-25

Assessment of SSAG (necessary for requests by scientists):

The investigation of the implementation of this OCR is recommended, as the observation of the Venus during its transit of the sun offers a very observation unique opportunity of Venus atmosphere. It is expected that the nominal limb-nadir sequence will be affected not significantly.

SSAG: H. Bovensmann	Date: 3.3.2004	Signature: e-mail, H. Bovensmann, 2004-03-04

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

SOST proposes the special Venus transit measurements as follows:

- use of the ASM diffuser
- PET and co-adding settings are those of the ASM diffuser calibration measurements, i.e. 1 sec integration time in all clusters
- start measurement at a Sun altitude as close to 120 km as possible because this is the altitude at which the preceding sun occultation measurement stops (solar elevation is about 25.3 deg)
- the ASM diffuser normal will point to an azimuth of 273 deg,
- the ASM diffuser rotates by 14 deg line of sight during the measurement, i.e. solar incidence onto the diffuser is about 50-64 deg (averaging of signal) - **see approach described below**
- the ESM will point to an altitude of 250 km (basic profile value as in ASM diffuser calibration measurements
- the ESM stays fixed during the measurement
- total ASM diffuser measurement time in one orbit (Sun occultation & calibration window) is about 100 sec, an additional 60 sec can be gained taking into account that the limb total clear field of view is slightly larger in elevation than specified
- the ASM diffuser measurement will be planned in each orbit from 11880 (ANX 8-JUN-2004, 00:20:19) to 11889 (ANX 8-JUN-2004, 15:25:42), i.e. total observation time is bout 1000-1600 sec with 400-640 sec for the transit phase

<table>
<tr><td colspan="3"><u>OCR Analysis (continued):</u>

In case it is finally preferred to execute the transit measurement without scanning the ASM diffuser, a two-step approach shall be pursued:
Step 1: A special ASM diffuser state as specified above shall be implemented. In addition a second ASM diffuser state which differs from the first one only by fixing the ASM diffuser normal at 273 deg (no scanning) during the measurement shall also be defined. For both special ASM diffuser states a test measurement shall be planned around mid April (2 orbits each) in order to ensure that the parameter settings are correct.
Step 2: Come to a final conclusion until April 20 (deadline for planning inputs) which special ASM diffuser state to use for the Venus transit observation. The state selected will be the one implemented on-board for June 8th.

Note that the test measurements do not reduce scientific data since they do only replace nominal scan measurements of the Sun above the atmosphere.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 10/03/2004</td><td>Signature: via e-mail
10/03/2004</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
K. Chance</td><td>Date: 10/03/2004</td><td>Signature: via e-mail
10/03/2004</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date: 2004-03-16</td><td>Signature: e-mail,
H. Bovensmann, 2004-03-16</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>

OCR shall be implemented as proposed.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date: 2004-03-16</td><td>Signature: e-mail,
Ch. Chlebek, 2004-03-16</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

<u>State Definition:</u> The states 17 and 18 are temporarily overwritten by modified ASM_diffuser states. Scanner State, State Duration and Basic Scan Profile tables have to be modified.
• Scanner State: phase 2 is set to 160 sec (= total measurement duration)
• State Duration: SDPU Duration is set to 2560 BCPS, Wait Measurement Execution to 40936 cts, State Duration to 43329 cts
• Basic Scan Profile:
– azimuth position of profile 4 is set to 0003089233 (diffuser normal + 180º = 177º) and scan rate to -001527 (14º in 160 sec) - this profile applies to modified state 17
– azimuth position of profile 10 is set to 0003089233 (diffuser normal + 180º = 177º) and scan rate to 0º (no scan) - this profile applies to modified state 18

<u>Timeline Definition:</u> Two timelines are generated in set 09. Timeline 09_01 executes the modified state 17 (with scan) and timeline 10_01 executes the modified state 18 (without scan). The Sun_fixed criterium had to be set to solar tangent_height = 150 km since the preceding occultation timeline stops above 100 km (variable over the year). The total measurement time per orbit within the <u>specified</u> limb TCFoV is about 95 sec. Another 30 sec can be gained from the wider limb TCFoV (the measurement phase is defined such that we observe the Sun even further in case the limb TCFoV is even wider - no exact figure does exist for the elevation width of the limb TCFoV).</td></tr>
</table>

Implementation by SOST (continued): Both timelines are high data rate timelines. It is confirmed that the longer high data rate duration because of the extended measurement interval (compared to nominal operations) is still well within the orbital phase where there is no conflict with MERIS operations. Measurement Execution: In orbits 11168/11169 the ASM_diffuser state with scan will be tested, in orbits 11171/11172 the ASM_diffuser state without scan (April, 19). Since the test measurement is executed 7 weeks earlier than the transit, the Sun incidence angle onto the ASM diffuser will be smaller by about 5º during these orbits. The actual Venus transit measurement will then be performed in orbits 11880-11889 (June 8) with the state finally selected.		
SOST: M. Gottwald, DLR-IMF	Date: 11/03/2004	Signature: via e-mail 11/03/2004

OCR_17: Increase Signal for High Northern & Southern Latitudes

SCIAMACHY	**Operation Change Request**	OCR No: 17 Issue: A
Title: Increase Signal for High Northern & Southern Latitudes		

Description of Request:

The implementation of OCR 12 (improved limb/nadir matching in early orbit phase) included the use of State N5 instead of states N1-N4. As a consequence, exposure times at higher latitudes are significantly shorter, resulting in higher spatial resolution (which is appreciated) but also in a reduced signal-to-noise ratio (SNR). In the wavelength region around 450 nm (NO_2 fitting window, exposure time 0.125 s) the signal at high solar zenith angles is about 50-200 BU which is close to the detector readout noise of about 5 BU. Further investigations revealed, contrary to earlier estimates, that the reduced SNR results in a reduced quality of the retrieved NO_2 columns for solar zenith angles larger than about 90° which cannot be compensated by on-ground co-adding. Therefore it is requested to change to pixel exposure times in the NO_2 fitting window to about 1 s for solar zenith angles larger than 90° to increase the SNR. The integration times below 90° solar zenith angle shall not be changed.

A possible implementation option would be to change the timelines such that for solar zenith angles larger than 90° a different state (with appropriate exposure time settings) is used. Note: This state should have the same duration as N5 to keep the improved limb/nadir matching.

Originator: A. Richter/S. Noël IFE/IUP	Date of Issue: 28 May 2004	Signature: e-mail, S. Noël 28 May 2004
Assessment of SSAG (necessary for requests by scientists):		
SSAG:	Date: 2004-02-11	Signature: 29.SSAG, MoM
Classification of OCR: D		

OCR Analysis (incl. Implementation Option):

This OCR requires modification of CTI parameter tables, i.e. the Pixel Exposure Time table and timelines. Since all timelines starting after the SO&C window and ending before the eclipse phase are affected, it is required to generate a new timeline set for routine measurements. There exist two options to implement the OCR.

Option 1: Use states nad01-nad04. Assign orbital phase ranges as listed in attached table. Below 0 deg and above 180 deg (approx. equivalent to solar zenith angles > 90 deg) the states nad01 and nad02 apply. Above 0 deg / below 26 deg and above 154 deg / below 180 deg states nad03 and nad04 are used. The PET table N3 (nad03) & N4 (nad04) are identical to the current table N5 (nad05) while tables N1 & N2 are identical to N5 except in channel 3 where a PET of 1 sec is used. Nadir states for small swath width and nadir_pointing scenarios are used correspondingly.
Option 2: Use state nad01. Assign orbital phase < 0 deg and > 180 deg (approx. equivalent to solar zenith angles > 90 deg) to nad01. The PET table N1 is identical to N5 except in channel 3 where a PET of 1 sec is used. Nadir states for small swath width and nadir_pointing scenarios are used correspondingly.

OCR Analysis (continued):

In both options the state duration of nad01-nad04 is maintained at a value to leave the limb/nadir matching unchanged, i.e. the State Duration table for nad01-nad03 needs update as well.

Option 1 provides maximum flexibility in case future OCRs require to modify additional settings in orbital phases < 26 deg or > 154 deg. Such modifications would then be possible by only changing CTI parameter tabels and no timelines as long as the orbit phases remain largely untouched. This would decouple OCR implementation from mission planning cycles. Option 2 has the advantage to leave a few nadir state IDs unused which could be used for other purposes. The associated disadvantage is that it might be required to always generate complete timeline sets for routine operations. This is much more timeconsuming than pure CTI parameter changes. There could also exist limitations from a configuration control point of view.

It is proposed to prepare 6 test timelines with the selected option and run these for 2 days at the beginning of the next planning cycle, i.e. end of July. The test timelines are timelines 47-52. In case careful data analysis proves that the settings are ok, the complete new timeline set will be generated, submitted to ESOC and uploaded at the earliest possible date. This could be around August 22nd.

Note that SOST-IFE had to check whether the modification of the PET in channel 3 to 1 sec and of the State Duration for nad01-nad03 is sufficient (all other settings, e.g. co-adding would remain unchanged with above implementation). After the analysis of SOST-IFE the following modifications are required for the new state N1:

All settings of N1 should be identical to N5 except (note that the state duration has to be the same as for N5):

a) set channel 3 PET to 1 s.
b) set all co-adding factors for channel 3 (i.e. clusters 12-20) to 1

For Option 1 the settings of N1 and N2 are identical, and the settings of N3 and N4 are identical to those of state N5. The resulting new PET and Co-add settings for Option 1 are listed in the Annex. The settings are compliant with the data rate limitations.

For Option 2 only the N1 settings need to be changed.

SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 01/06/2004	Signature: via e-mail 01/06/2004

Approval of Proposed Implementation:

Option 1 should be implemented because it provides a larger flexibility.
Note that similar problems with S/N can be expected for other wavelength regions / data products. Therefore it may be required to further adapt the state settings at a later time, but this will be covered (if necessary) by a new OCR.

Originator Approval: S. Noël	Date: 15. June 2004	Signature: email 15 June 2004
SSAG Approval: H. Bovensmann	Date: 15. June 2004	Signature: given during PCR Meeting at DLR Bonn

<table>
<tr><td colspan="3">

Decision / Approval:

The proposed test timelines shall be performed. Originator /SSAG shall review the measurement data from these test measurements. The approval for the final implementation will be given only after having received a positive statement by the SSAG based on the results of the test measurements.

Status after test measurements: Stefan Noël stated that IFE analysis of the test measurements for OCR 17 performed on 23/24 July 2004 shows an improvement of the channel 3 NO_2 results (SNR) - see e-mail, S.Noël, 2004-07-27. Therefore the final implementation of the new timelines/states shall be done as described.

</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date:
2004-06-17 & 2004-07-28</td><td>Signature:
Ch. Chlebek</td></tr>
<tr><td colspan="3">

Implementation by SOST:

Option 1 implementation for the test case includes generation of

- 3 Scanner State CTI tables (states nad01-nad03)
- 4 PET CTI tables (states nad01-nad04 for PET N1-N4)
- 3 State Duration CTI tables (nad01-nad03)
- 4 Co-adding CTI tables (21-24)
- 6 timelines (test set 09, t/l ID 47-52, sub-ID 03)

Note that only those nadir tables are modified which are used in the test timelines. The states with nadir small swath width and nadir pointing are not modified for the test run.

The test timelines are planned for execution in orbits 11525-11552 (23/24 July). After the test, the state parameters and timelines are reset to the nominal settings.

The final implementation of option 1 – provided that the test is successful - includes generation of

- 9 Scanner State CTI tables (states nad01-nad03, nad09-nad11, nad23-nad25)
- 12 PET CTI tables (states nad01-nad04, nad09-nad12, nad23-nad26 for PET N1-N4)
- 9 State Duration CTI tables (nad01-nad03, nad09-nad11, nad23-nad25)
- 4 Co-adding CTI tables (21-24)
- a complete new timeline set 33 for nominal operations (alternating limb/nadir, wide swath – final flight set FFT_0408025)

Since the parameter modifications are permanent (final flight set FFS_040825), they must be reflected in the ERCORMS file. The associated SCIAMACHY Operation Change Request will be generated and submitted to ESOC accordingly. Please note that the eclipse timeline 44 executing state nad09 is also affected by OCR_17 since the maximum PET of 10 sec is reduced to 1 sec and state duration is reduced from 80 sec to 65 sec, i.e. co-adding has to be done on-ground.

Final implementation of option 1 is forseen on August 25th. Note that this date has been finally shifted to September 6th (orbit 13172) for logistics reasons, i.e. the final flight state and timeline configurations will become FFS_040906 and FFT_040906 (instead (FFS_040825 and FFT_040825 as proposed above).

</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 18/06/2004 &
28/07/2004</td><td>Signature: via e-mail
18/06/2004 & 28/07/2004</td></tr>
</table>

Appendix 1:

Orbital positions for nadir states used in timelines as proposed in OCR_17 implementation.

Option 1:

Orbital Position (deg)	Nadir (960 km)	Nadir (120 km)	Nadir (pointing)
<-3	nad01	nad09	nad23
-3 to 0	nad02	nad10	nad24
0 to 16	nad03	nad11	nad25
16 to 26	nad04	nad12	nad26
26 to 36	nad05	nad13	nad27
36 to 70	nad06	nad14	nad28
70 to 110	nad07	nad15	nad29
110 to 144	nad06	nad14	nad28
144 to 154	nad05	nad13	nad27
154 to 164	nad04	nad12	nad26
164 to 180	nad03	nad11	nad25
180 to 183	nad02	nad10	nad24
>183	nad01	nad09	nad23

Option 2:

Orbital Position (deg)	Nadir (960 km)	Nadir (120 km)	Nadir (pointing)
<0	nad01	nad09	nad23
0 to 36	nad05	nad13	nad27
36 to 70	nad06	nad14	nad28
70 to 110	nad07	nad15	nad29
110 to 144	nad06	nad14	nad28
144 to 180	nad05	nad13	nad27
>180	nad01	nad09	nad23

Appendix 2:

New PET and coadd settings for Option 1

PET settings for Option 1 (changes are marked yellow)

Table	Channel 1a	Channel 1b	Channel 2a	Channel 2b	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
N1	1	0,5	0,5	0,5	1	0,125	0,25	0,125	1	1
N2	1	0,5	0,5	0,5	1	0,125	0,25	0,125	1	1
N3	1	0,5	0,5	0,5	0,125	0,125	0,25	0,125	1	1
N4	1	0,5	0,5	0,5	0,125	0,125	0,25	0,125	1	1

Coadding tables for Option 1 (changes are marked yellow)

CO_ADDING 21 (N1)

Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING 22 (N2)

Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Coadding tables for Option 1 (changes are marked yellow), continued

CO_ADDING 23 (N3)

Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING 24 (N4)

Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

OCR_18: Change Timeline CTI File Generation (State-count, Fixed Length = 64, Default Entries)

SCIAMACHY	**Operation Change Request**	OCR No: 18 Issue: A

Title: Change Timeline CTI File Generation (State-count, Fixed Length = 64, Default Entries)

Description of Request:

The IOM MA_SCIA-0000DO/01 requires in §12.2 for timeline loading:

Usage of the SET TIMELINE MCMD ZI053-99 in flight

For practical reasons the following rules have been established:

- Timelines are loaded as a whole, i.e. one MCMD for one Timeline
- The MCMD ZI053-99 has a fixed length of 64 State entries. Up to 63 entries can be used for Measurement States and one must be used as State 255, which is the "End of Timeline" marker
- Timelines with less than 64 States will be loaded such, that n States will be allocated to the entries 1 through n, being followed by"0" entries from n+1 to 64. Note: per definition n includes the "End of Timeline" marker which is State 255
- ESOC will generate the MCMD ZI053-99 using the DLR inputs via the CTI-Interface for SVTs and in flight. The corresponding file which is used as input from SOST to ESOC is: CTI_Txx_SH, with xx = 1...63.

The 2nd bullet defines a fixed length of MCMD ZI053-99 of 64 entries, the 3rd bullet specifies, that 'unused' entries are filled by default with '0' .

The present version of the timeline CTI converter produces timeline CTI files with variable length, which is in conformance to the definition of the MCMD in IOM annex 6 here A6.57. Presently the parameter 'state count' used in MCMD ZI053-99 represents the number of entries 'n' in bullet 3 above. Since the transcription of the received CMD by the ICU to the onboard parameter store works such, that based on the parameter 'state-count' only entries 1 to 'n' are inserted, the length of the parameter block loaded into onboard tables is not '64' as required in bullet 2 above but 'n' and the filling entries with default value '0' are not entered. In consequence former entries in the onboard table are not overwritten by the new default value '0' at entries higher than 'n' but remain. Detailed analysis at ASTRIUM and SOST confirm above findings.

To establish conformance of the content of the transmitted timeline CTI file with the requirements of IOM §12.2 the CTI converter output shall be changed to produce above required onboard TL-table format (see also attached e-mails dated 4th February 2003 and 21st May 2004).

Originator: E. Krieg DLR/IMF-AP	Date of Issue: 16 June 2004	Signature: e-mail, E. Krieg 16 June 2004
Assessment of SSAG (necessary for requests by scientists): ***not required*** *(SCIA-FOCC-i/f specific)*		
SSAG:	Date	Signature:

<table>
<tr><td colspan="3">Classification of OCR: D</td></tr>
<tr><td colspan="3"><u>OCR Analysis (incl. Implementation Option):</u>
This OCR requires modification of the generation of timeline CTI files, i.e. the files shall 'force' the ICU to transmit the full fixed length parameter block of the CTI-file into the TL-onboard store (RAM). SOST-DLR has developed an update to the present TL-CTI-converter, which produces fixed length parameter blocks (n=64 with '0-fillers') and sets the state count permanently to length = 64.
Note:
• according to attached e-mails the compliance of this OCR to the onboard system is confirmed by ASTRIUM (see attached e-mails)
• since the change affects the SCIAMACHY-FOCC i/f it is required, that ESOC checks the findings and proposed implementation for compliance with CMD generation at ESOC</td></tr>
<tr><td>SOST: E. Krieg, DLR/IMF-AP</td><td>Date: 16/06/2004</td><td>Signature: via e-mail 16/06/2004</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:</td><td>Date:</td><td>Signature:</td></tr>
<tr><td>Astrium Approval:
P. Lützow</td><td>Date:
2004-06-22</td><td>Signature:
e-mail, P. Lützow, 2004-06-22</td></tr>
<tr><td>ESOC Approval:
F.Diekmann, A.Moore
Minutes of telecon</td><td>Date:
2004-06-25</td><td>Signature:
e-mail, A. Moore, 2004-06-25</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>
The OCR shall implemented as proposed.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date:
2004-07-28</td><td>Signature:
e-mail, Ch. Chlebek, 2004-07-28</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>
For orbit 13291 (September 14th), 4 test timelines covering a complete orbit (ID 1, 47, 53, 63) are generated with the modified converter as proposed by OCR_18. The test timelines are transferred to FOCC, uploaded and executed (note that the scientific content does not differ from the corresponding timelines for routine operations). Provided that the test timelines run as expected it is proven that the converter modification can be regarded as operational and all timeline CTI files to be generated from this date on will be based on the modified converter.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 28/07/2004</td><td>Signature: via e-mail 28/07/2004</td></tr>
</table>

Appendix : email exchange DLR - ASTRIUM and ESOC

a.

Von: Krieg, Eckhart
Gesendet: Dienstag, 4. Februar 2003 15:47
An: 'Kroeger, Hans'; Gottwald, Manfred
Cc: Peter Luetzow-Wentzky; Toni Niessen
Betreff: AW: Timeline MCMD

Hi,

das ist soweit ich mich erinnere ganz richtig so. Der converter ist auch so gebaut, nur das FOCC hat wie wir aus dem dump im Dezember sahen, nicht den kompletten Inhalt des CTI-files geladen, sondern füllt das template ZI053-99 so, daß der parameter 'STATE COUNT' die Länge des Datenblocks des MCMD bestimmt und nicht wie von uns erwartet die CTI-header Information bzgl. der Länge des Datenblocks, die bei uns auf den festen Wert = 130 gesetzt ist(64+2 TL-entries + start-index + state-count).
Deshalb hatten wir hier beim Dump im Dezember noch die alten Werte der Vorläufer-TL's an den indices stehen, an denen in den neuen Versionen eigentlich die '0' mittels mcmd durch Überscheriben dieser Werte eingetragen werden sollte.
Ich bastle in den nächsten Tagen am Converter weiter, um da auf ein vernünftiges Konzept zu kommen.
Gruß

ekg

-----Ursprüngliche Nachricht-----
Von: Kroeger, Hans [mailto:Hans.Kroeger@astrium-space.com]
Gesendet: Dienstag, 4. Februar 2003 13:51
An: Krieg, Eckhart; Gottwald, Manfred
Cc: Peter Luetzow-Wentzky; Toni Niessen
Betreff: Timeline MCMD

Im IOM habe ich gefunden:

Usage of the SET TIMELINE MCMD ZI053-99 in flight
For practical reasons the following rules have been established:
* Timelines are loaded as a whole, i.e. one MCMD for one Timeline
* the MCMD ZI053-99 has a fixed length of 64 State entries. Up to 63 entries can be used for Measurement States and one must be used as State 255, which is the "End of Timeline" marker
* Timelines with less than 64 States will be loaded such, that n States will be allocated to the entries 1 through n, being followed by"0" entries from n+1 to 64. Note: per definition n includes the "End of Timeline" marker which is State 255
* ESOC will generate the MCMD ZI053-99 using the DLR inputs via the CTI-Interface for SVTs and in flight. The corresponding file which is used as input from SOST to ESOC is:
CTI_Txx_SH, with xx = 1...63

Frage: ist das gültig?

Gruss
--hk

b.

Von: Luetzow-Wentzky, Peter
[mailto:Peter.Luetzow.Wentzky@astrium.eads.net]
Gesendet: Freitag, 21. Mai 2004 20:00
An: Krieg, Eckhart
Cc: Gottwald, Manfred; Kroeger, Hans; Niessen, Toni
Betreff: RE: TL-CTI-format

Hallo Eckhart,

unser ICU-S/W-Experte hat mir Deine Annahme (letzter Satz der Mail) bestätigt.

Die MCMD-Länge wird nur bei MCMD_Reception benutzt, um zu prüfen, ob an der erwarteten Stelle der MCMD trailer gefunden wird. Bei der weiteren Kommandoverarbeitung ist die Länge gar nicht mehr verfügbar. Der Umfang der Übertragung aus dem Empfangspuffer in den TL store richtet sich ausschließlich nach dem State Count.

Ich habe auch prüfen lassen, ob eine Heraufsetzung des State Count auf 64 fix bei der gegebenen Länge des Set Timeline MCMD ZI053-99 zu Problemen führen könnte. Die Antwort ist NEIN.
Es gibt weder mit dem State Count Parameter selbst noch mit den zu übertragenden Füllwerten 0 für State ID und Timetag Probleme.
Ich würde daher raten, dies entsprechend zu ändern und damit den Inhalt der von Dir gelieferten CTI Files (Timeline mit auffüllenden Nullen) auch vollständig in die ICU zu laden.

Übrigens ist in dem in der Datenbank an ESOC abgelieferten MCMD ZI053-99 ein Default Wert von 64 für "State Count" bereits eingetragen.

Schöne Grüße und schönes Wochenende,
Peter.

-----Original Message-----
From: Krieg, Eckhart [mailto:Eckhart.Krieg@dlr.de]
Sent: Dienstag, 23. September 2003 15:24
To: 'Diekmann Frank-Jürgen (E-Mail)'; 'Andrew Moore (E-Mail)'
Cc: Gottwald, Manfred; Kroeger, Hans; Niessen, Toni; Luetzow-Wentzky, Peter;
Daniel Mesples (E-Mail)
Subject: TL-CTI-format

Hi Frank and Andy,

I talked now to Toni to discuss the results from last year's analysis of the final-flight dumps, when he and Daniel realised mismatches between 2 dumps of 2 subsequent loads of the nearly identical full 'Flight parameter configuration' in particular within the tl-store. The subsequent analysis by myself showed, that we had remainders of former tl-loads, when the newer tl was shorter than the former one.
Today a coarse analysis of tl-CTI-files and executed mcmds showed, that the cmds were produced in all cases with a fixed full length

parameter block resp. mcmd irrespectively of the actual length of the tl.

Toni confirmed my opinion, that the truncation of the mcmd parameter block is almost certainly done by the SCIA ICU.
This is based on the inspection of the CTI-file (length of the parameter block = 130) and the inspection of the uplinked mcmd via SPEVAL (mcmd-header with mcmd-length = 87hex) with both files containing the parameter state-count with the actual number smaller than 64 and containing in all cases always a fixed number of entries = 64 as specified by the IOM using default values '0' as fillers for unused entries past the End of Timeline marker.

As we are not at all shure, what a change in the parameter definition for the parameter state-count could cause onboard, we have decided to leave the situation presently as is.
I will continue to produce in the CTI-file the actual state count thus the ICU will not overwrite any parameter past the End of Timeline marker with
the default value '0'. Insofar we will see mismatches in the tl-RAM-area with any comparison of dumps .
We consider this as a minor effect since any nominal tl-swapping between dumps would also cause a miscompare. An analysis of the tl-load history would be needed in such a case as well.

The pending transfer of the full Tl-set for improved limb/nadir-matching will be done using the proven converter output as up to now.

To Hans:
referring to mail 'timeline mcmd' dated 4 February 2003 I have to state:
the generation of the tl-CTI-file and its content as well as the transcription into the executable mcmd by FOCC are both in full compliance with IOM chapters 4 p.11 & 12 p. 8 and IOM A6 p.99. It seems, that SCIA-ICU uses not the mcmd length in the mcmd-header but state-count in the data block to define the block length of data to be written into the tl-store.

> Eckhart

OCR_19: Replacement of Eclipse Nadir Measurements by Limb Mesosphere Measurements and Modification of Eclipse Measurement Timeline of the 'Converted Nadir Orbits'

SCIAMACHY	**Operation Change Request**	OCR No: 19 Issue: A-2
Title: Replacement of Eclipse Nadir Measurements by Limb Mesosphere Measurements and Modification of Eclipse Measurement Timeline of the 'Converted Nadir Orbits'		

Description of Request:

The limb mesosphere measurements made during eclipse in the mesosphere/lower thermosphere have proven to be extremely valuable for the retrieval of mesopause temperatures from the hydroxyl Meinel band airglow emissions. Unfortunately, the number of available limb mesosphere measurements as well as the latitudinal coverage of the eclipse limb mesosphere measurements is far from its optimum. Particularly in the southern hemisphere, there are no measurements at mid and high latitudes.

Therefore, we request the following 2 changes:

a) In order to increase the number of limb mesosphere observations we request the eclipse nadir observations (performed every other orbit) be replaced by limb mesosphere measurements.
We think this request is justified for the following reasons:
- To date, nobody has looked at the nadir ecplipse data, whereas the limb mesosphere observations have shown great potential in monitoring the mesopause temperature.
- All potential applications of nighttime nadir observations related to terrestrial airglow emissions and Non-LTE processes can also be done with the limb mesosphere observations, since the emissions are also observed in the limb spectra. The limb mesosphere observations even have the advantage of a much longer path through the emitting layer leading to a significant improvement of the signal strength (by almost 2 orders of magnitude).
- A nadir nighttime data set of two years has been collected already, providing sufficient material for first scientific studies, if anyone should become interested in this data set. If the nadir nighttime observations should be given a higher scientific priority in the future (for whatever reason) the continuous collection of nadir eclipse measurements can always be resumed again.

b) In order to improve the latitudinal coverage of the limb mesosphere measurements we request to change the eclipse timeline for the orbits of the previous 'nadir orbits' (if they get converted to 'limb orbits' as requested in a)). So far the measurement timeline on the Earth's nightside starts with a block of dark current measurements (Measurement category 12), followed by a block of limb mesosphere measurements (Measurement category 26). Then again a sequence of dark current, limb, dark current measurements. We would like to replace the first dark current block with the first limb mesosphere measurement block in order to have nighttime limb measurements at higher southern latitudes.
The advantage of changing the timeline for the the converted 'nadir orbits' (see request a), is that the timeline for the existing 'limb orbits' remains unchanged.

Originator: Christian von Savigny, Heinrich Bovensmann	Date of Issue: 2004-06-16	Signature: CvS 2004-06-16
Assessment of SSAG (necessary for requests by scientists): The OCR was discussed at the tiger team meeting and considered acceptable for implementation provided that the • dark current measurements in eclipse are not endangered • PI's accept the change in mission scenarios		
SSAG: S. Noël, IFE	Date: 09/07/2004	Signature: via phone 09/07/2004
Classification of OCR: C		

OCR Analysis (incl. Implementation Option):

Part a) of the OCR is implemented by no longer using state nad09 in an eclipse timeline. Approval for this modification must bear in mind that this is equivalent to a permanent change in mission scenarios.

Part b) of the OCR requires to partially overwrite the accepted and implemented OCR_06 (*Increase of dark current blocks in the eclipse timeline*) since the modified eclipse timeline 44 (replace nad09 state by elimb01 state) must start and end with a sequence of limb_mesosphere states, i.e. not with a block of 5 dark current states. In addition, due to the limitation not to exceed a timeline duration of about 1250 sec, there are two consecutive dark current blocks. In case this is accepted by calibration experts, a new timeline 44 will be generated which fulfills the new requirement of OCR_19. Attached is an example (option 1) how this timeline will look like and the comparison to timeline 53 (limb_mesosphere) with the 2nd block of elimb01 states increased by 1 state (see figs 1 & 2).

For comparison, an alternatively modified timeline 44 (option 2a, fig.3) is presented, where throughout the timeline dark current states and limb_mesosphere states alternate. This can be regarded as a compromise both serving dark current calibration and limb_mesosphere needs. The total number of dark current and limb_mesosphere states is the same as in the option 1 timeline. Note that if this acceptable for both parties, one could expand on that approach even further and define a second eclipse timeline of this type but with dark current and limb_mesosphere states shifted by one state (option 2b, fig.3). Alternating scheduling of option 2a and 2b would then lead to a full coverage of the eclipse phase with limb_mesosphere measurements in two consecutive orbits. The option 2b timeline would be used instead of timeline 53.

Since the modification impacts the final flight timeline set, where a new set 33 will be in preparation soon as a consequence of OCR_17, it is suggested to include OCR_19 in this timeline set as well – provided the OCR is accepted. Otherwise maintenance of final flight timelines in the ground segment becomes more and more complex. Thus acceptance of OCR_19 (part a and b) should be finalised until about July 10th when timeline set 33 generation will start.

<table>
<tr><td colspan="3">

OCR Analysis (continued):

Modified implementation option following discussions with Q. Kleipool, H. Bovensmann (20/07/2004):
The implementation of OCR_19 has to comply with the requirements of dark current measurements. These can be summarized as follows:

- all 5 dark current states in a block must not be separated by other states
- there must be at least one complete block of dark current states finished in eclipse before ANX

Thus option 2 as described above cannot be realized (violating the first requirement). Option 1 as described above can also not be implemented because due to the seasonal variation in December (see fig. 4) dark current block 1 of the modified timeline 44 would fall onto ANX and no complete dark current block would be established in eclipse at the end of an orbit (violating the second requirement).

It is therefore proposed to alter option 1 slightly by shortening the limb_mesopshere block at the start of timeline 44. The modified option 1 is referred here as option 1a. In option 1a 3 limb_mesosphere states are executed in timeline 44 before the first dark current block. This moves the dark current block by 132 sec towards ANX as compared to the current timeline 44. December 26th, when eclipse start is closest to ANX, the first dark current block will be scheduled at 5799 sec elapsed time in an orbit. With a duration of about 208 sec, the first block will stop about 30 sec before ANX (see fig. 7). Thus both requirements for the dark current measurements are satisfied. The rest of timeline 44 is filled with dark current states and limb_mesosphere states as listed in fig. 5. The coverage with limb_mesosphere states in eclipse, when executing timelines 53 and 44 (option 1a) consecutively, is displayed in fig. 6. Except of a small gap of 75 sec in the early phase of the eclipse timelines an almost complete coverage can be realized.

</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 21/06/2004 &
21/07/2004</td><td>Signature: via e-mail
21/06/2004 & 21/07/2004</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval: Christian von Savigny, Heinrich Bovensmann</td><td>Date: 21/07/2004</td><td>Signature: via e-mail
21/07/2004</td></tr>
<tr><td>SSAG Approval: Heinrich Bovensmann</td><td>Date: 21/07/2004</td><td>Signature: via e-mail
21/07/2004</td></tr>
<tr><td colspan="3">

Decision / Approval:

The modified option 1, as described in the attachment, shall be implemented. Calibration experts (Q. Kleipool) have also agreed to the proposed approach since the dark current requirements are fully maintained. PI's (e-mails July 19th and 28th) support the change as well.

</td></tr>
<tr><td>DLR Approval:
(if necessary NIVR, SPEC)
C. Chlebek, DLR</td><td>Date: 30/07/2004</td><td>Signature: via phone
30/07/2004</td></tr>
</table>

<table>
<tr><td colspan="3">
<u>Implementation by SOST:</u>

The modified option 1 is implemented by generating a new timeline 44 in set 33 (required by OCR_17) which contains a state sequence as listed in the attachment. All nadir_eclipse states are replaced by limb_mesosphere states. It is ensured that the first dark current block ends prior to ANX throughout the year.

Timeline 53 in set 33 was increased by 1 state. Thus both eclipse timelines are now of identical duration (1288 sec).

The new timeline set 33 will be uploaded in orbit 13172 (September 6th). From that orbit onwards there are only limb_mesosphere measurements in eclipse.
</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 03/08/2004</td><td>Signature: via e-mail
03/08/2004</td></tr>
</table>

State Index	T/L 53				Option 1: T/L 44 modified (OCR_019)			
	State ID	State	State Start (sec)	State Stop (sec)	State ID	State	State Start (sec)	State Stop (sec)
1	8	dcc05	2,77	46,33	27	elimb01	2,77	46,83
2	26	dcc04	46,33	79,89	27	elimb01	46,83	90,89
3	46	dcc01	79,89	93,45	27	elimb01	90,89	134,95
4	63	dcc02	93,45	127,00	27	elimb01	134,95	179,00
5	67	dcc03	127,00	210,57	27	elimb01	179,00	223,06
6	27	elimb01	210,57	254,63	8	dcc05	223,06	266,62
7	27	elimb01	254,63	298,68	26	dcc04	266,62	300,18
8	27	elimb01	298,68	342,74	46	dcc01	300,18	313,74
9	27	elimb01	342,74	386,80	63	dcc02	313,74	347,30
10	27	elimb01	386,80	430,86	67	dcc03	347,30	430,86
11	27	elimb01	430,86	474,92	8	dcc05	430,86	474,42
12	27	elimb01	474,92	518,98	26	dcc04	474,42	507,98
13	27	elimb01	518,98	563,04	46	dcc01	507,98	521,54
14	8	dcc05	563,04	606,59	63	dcc02	521,54	555,09
15	26	dcc04	606,59	640,15	67	dcc03	555,09	638,66
16	46	dcc01	640,15	653,71	27	elimb01	638,66	682,71
17	63	dcc02	653,71	687,27	27	elimb01	682,71	726,77
18	67	dcc03	687,27	770,83	27	elimb01	726,77	770,83
19	27	elimb01	770,83	814,89	27	elimb01	770,83	814,89
20	27	elimb01	814,89	858,95	27	elimb01	814,89	858,95
21	27	elimb01	858,95	903,01	8	dcc05	858,95	902,51
22	27	elimb01	903,01	947,07	26	dcc04	902,51	936,07
23	27	elimb01	947,07	991,13	46	dcc01	936,07	949,63
24	27	elimb01	991,13	1035,18	63	dcc02	949,63	983,18
25	27	elimb01	1035,18	1079,24	67	dcc03	983,18	1066,75
26	8	dcc05	1079,24	1122,80	27	elimb01	1066,75	1110,80
27	26	dcc04	1122,80	1156,36	27	elimb01	1110,80	1154,86
28	46	dcc01	1156,36	1169,92	27	elimb01	1154,86	1198,92
29	63	dcc02	1169,92	1203,48	27	elimb01	1198,92	1242,98
30	67	dcc03	1203,48	1287,04	27	elimb01	1242,98	1287,04

Fig. 1: Eclipse timelines 53 and 44 (modified to comply with OCR_19)

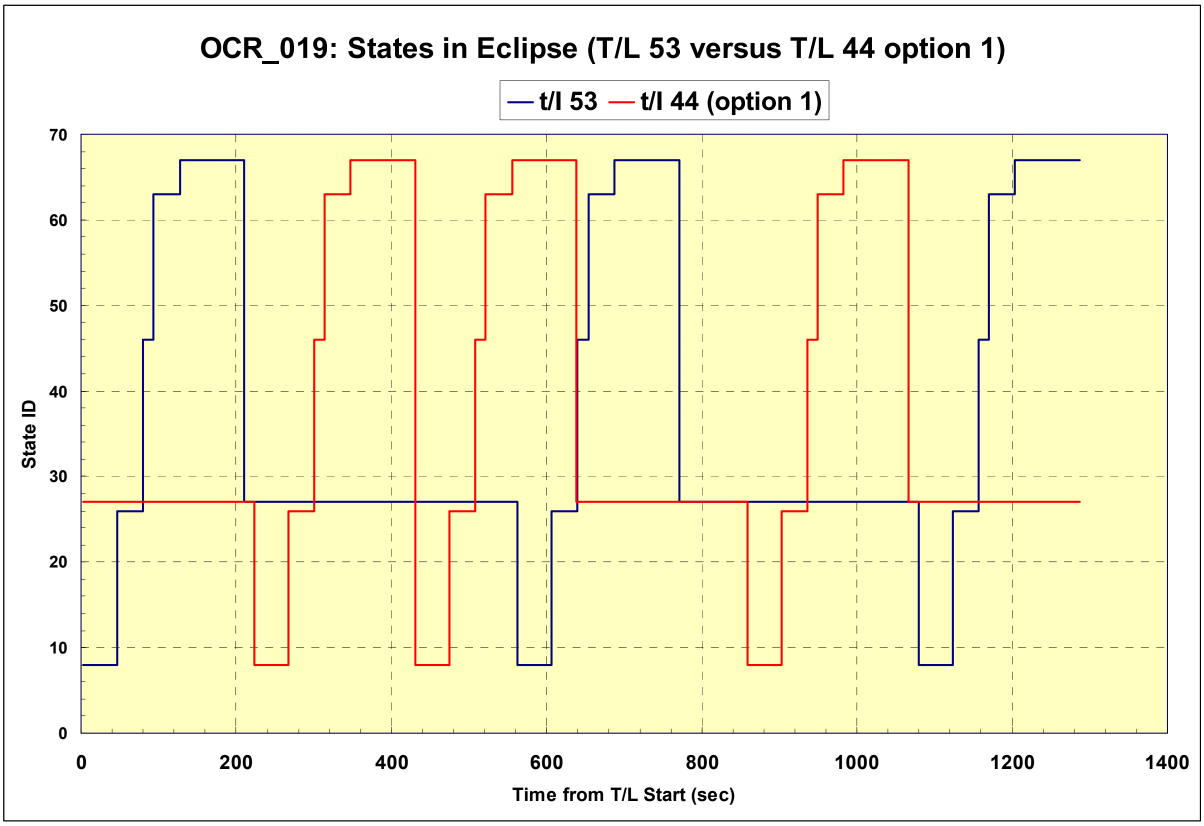


Fig. 2: Execution of dark current states (ID 8,26,46,63,67) and limb_mesosphere states (ID 27) as a function of time elapsed since start of eclipse timelines 53 and 44 (modified to comply with OCR_19)

State Index	Option 2a: alternative T/L 44 (seq. 1)				Option 2b: alternative T/L (seq. 2)			
	State ID	State	State Start (sec)	State Stop (sec)	State ID	State	State Start (sec)	State Stop (sec)
1	8	dcc05	2,77	46,33	27	elimb01	2,77	46,83
2	27	elimb01	46,33	90,39	8	dcc05	46,83	90,39
3	26	dcc04	90,39	123,95	27	elimb01	90,39	134,45
4	27	elimb01	123,95	168,00	26	dcc04	134,45	168,00
5	46	dcc01	168,00	181,56	27	elimb01	168,00	212,06
6	27	elimb01	181,56	225,62	46	dcc01	212,06	225,62
7	63	dcc02	225,62	259,18	27	elimb01	225,62	269,68
8	27	elimb01	259,18	303,24	63	dcc02	269,68	303,24
9	67	dcc03	303,24	386,80	27	elimb01	303,24	347,30
10	27	elimb01	386,80	430,86	67	dcc03	347,30	430,86
11	8	dcc05	430,86	474,42	27	elimb01	430,86	474,92
12	27	elimb01	474,42	518,48	8	dcc05	474,92	518,48
13	26	dcc04	518,48	552,04	27	elimb01	518,48	562,54
14	27	elimb01	552,04	596,09	26	dcc04	562,54	596,09
15	46	dcc01	596,09	609,65	27	elimb01	596,09	640,15
16	27	elimb01	609,65	653,71	46	dcc01	640,15	653,71
17	63	dcc02	653,71	687,27	27	elimb01	653,71	697,77
18	27	elimb01	687,27	731,33	63	dcc02	697,77	731,33
19	67	dcc03	731,33	814,89	27	elimb01	731,33	775,39
20	27	elimb01	814,89	858,95	67	dcc03	775,39	858,95
21	8	dcc05	858,95	902,51	27	elimb01	858,95	903,01
22	27	elimb01	902,51	946,57	8	dcc05	903,01	946,57
23	26	dcc04	946,57	980,13	27	elimb01	946,57	990,63
24	27	elimb01	980,13	1024,18	26	dcc04	990,63	1024,18
25	46	dcc01	1024,18	1037,74	27	elimb01	1024,18	1068,24
26	27	elimb01	1037,74	1081,80	46	dcc01	1068,24	1081,80
27	63	dcc02	1081,80	1115,36	27	elimb01	1081,80	1125,86
28	27	elimb01	1115,36	1159,42	63	dcc02	1125,86	1159,42
29	67	dcc03	1159,42	1242,98	27	elimb01	1159,42	1203,48
30	27	elimb01	1242,98	1287,04	67	dcc03	1203,48	1287,04

Fig. 3: Two eclipse timelines which ensure full eclipse coverage with limb_mesosphere states in consecutive orbits. Dark current measurements are still executed in blocks of 5 states but between individual dark current states a limb_mesosphere state is planned. This could be an alternative to the modification of timeline 44 as required in OCR_19.

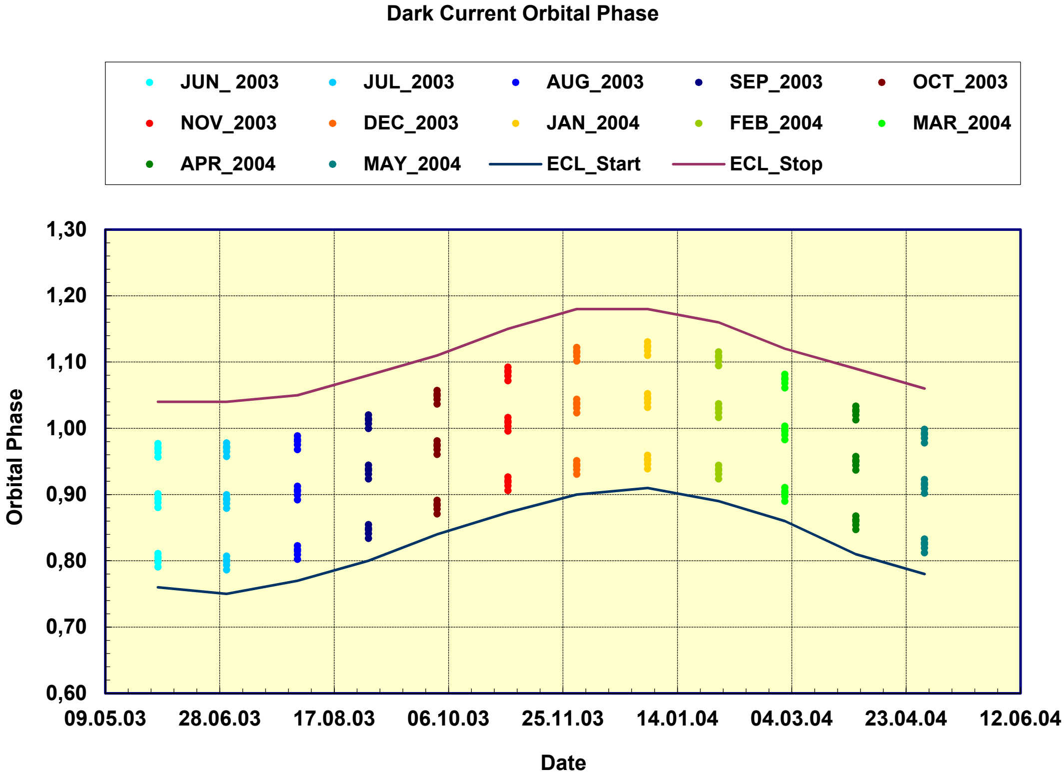


Fig. 4: Dark current block (5 dcc states each) start location in eclipse for a complete year showing the seasonal variation. Only a single orbit at the start of a month is displayed. Each of the 3 dark current blocks consists of 5 dark current states. The blocks are executed at the beginning, in the middle and at the end of the eclipse timeline. Orbital Phase is derived from the time elapsed since ANX (phase 0 and 1 correspond to ANX). Eclipse starts when the solar elevation is 28.5°, i.e. just below the horizon seen from the ENVISAT orbit. Eclipse stops when the first limb state in the Sun occultation timeline starts. The gaps between the dark current blocks are filled with either nadir_eclipse or limb_mesopshere states. The gap before the first block is required for ADC calibration and potential engineering activities. The gap after the third block is required for potential CTI/timeline uploads. These two cannot be overwritten by measurement states.

State Index	T/L 53				Option 1a: T/L 44 modified (OCR_019)			
	State ID	State	State Start (sec)	State Stop (sec)	State ID	State	State Start (sec)	State Stop (sec)
1	8	dcc05	2,77	46,33	27	elimb01	2,77	46,83
2	26	dcc04	46,33	79,89	27	elimb01	46,83	90,89
3	46	dcc01	79,89	93,45	27	elimb01	90,89	134,95
4	63	dcc02	93,45	127,00	8	dcc05	134,95	178,50
5	67	dcc03	127,00	210,57	26	dcc04	178,50	212,06
6	27	elimb01	210,57	254,63	46	dcc01	212,06	225,62
7	27	elimb01	254,63	298,68	63	dcc02	225,62	259,18
8	27	elimb01	298,68	342,74	67	dcc03	259,18	342,74
9	27	elimb01	342,74	386,80	8	dcc05	342,74	386,30
10	27	elimb01	386,80	430,86	26	dcc04	386,30	419,86
11	27	elimb01	430,86	474,92	46	dcc01	419,86	433,42
12	27	elimb01	474,92	518,98	63	dcc02	433,42	466,98
13	27	elimb01	518,98	563,04	67	dcc03	466,98	550,54
14	8	dcc05	563,04	606,59	27	elimb01	550,54	594,60
15	26	dcc04	606,59	640,15	27	elimb01	594,60	638,66
16	46	dcc01	640,15	653,71	27	elimb01	638,66	682,71
17	63	dcc02	653,71	687,27	27	elimb01	682,71	726,77
18	67	dcc03	687,27	770,83	27	elimb01	726,77	770,83
19	27	elimb01	770,83	814,89	27	elimb01	770,83	814,89
20	27	elimb01	814,89	858,95	27	elimb01	814,89	858,95
21	27	elimb01	858,95	903,01	8	dcc05	858,95	902,51
22	27	elimb01	903,01	947,07	26	dcc04	902,51	936,07
23	27	elimb01	947,07	991,13	46	dcc01	936,07	949,63
24	27	elimb01	991,13	1035,18	63	dcc02	949,63	983,18
25	27	elimb01	1035,18	1079,24	67	dcc03	983,18	1066,75
26	8	dcc05	1079,24	1122,80	27	elimb01	1066,75	1110,80
27	26	dcc04	1122,80	1156,36	27	elimb01	1110,80	1154,86
28	46	dcc01	1156,36	1169,92	27	elimb01	1154,86	1198,92
29	63	dcc02	1169,92	1203,48	27	elimb01	1198,92	1242,98
30	67	dcc03	1203,48	1287,04	27	elimb01	1242,98	1287,04

Fig. 5: Eclipse timelines 53 and 44 (option 1a - modified to comply with OCR_19 and to fulfill the requirements for dark current measurements in eclipse)

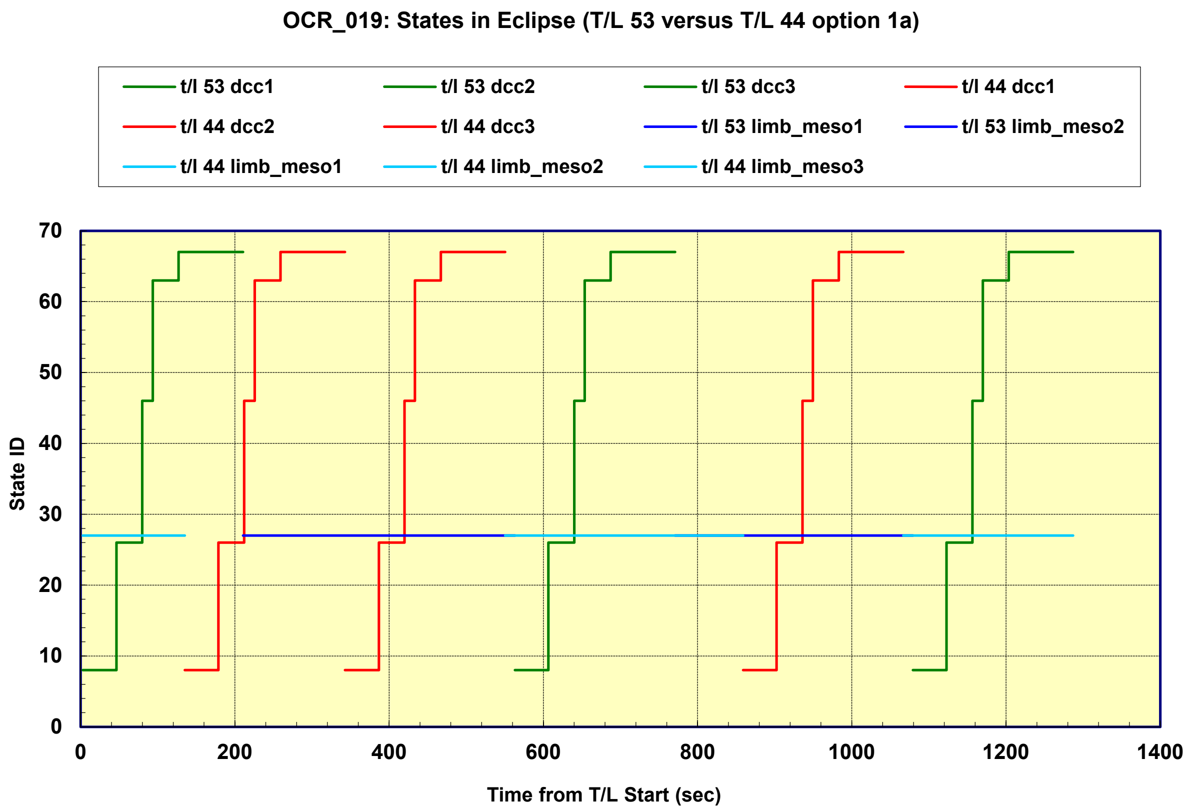


Fig. 6: Execution of dark current states (ID 8,26,46,63,67) and limb_mesosphere states (ID 27) as a function of time elapsed since start of eclipse timelines 53 and 44 (option 1a - modified to comply with OCR_19 and dark current requirements). In timeline 53 3 dark current blocks (dcc1-dcc3) and 2 limb_mesosphere blocks (limb_meso1, limb_meso2) are defined. Timline 44 (option 1a) consists of 3 dark current blocks and 3 limb mesosphere blocks. Alternating execution of timelines 53 and 44 leads to an almost complete coverage of the eclipse phase with limb_mesosphere states (dark and pale blue line).

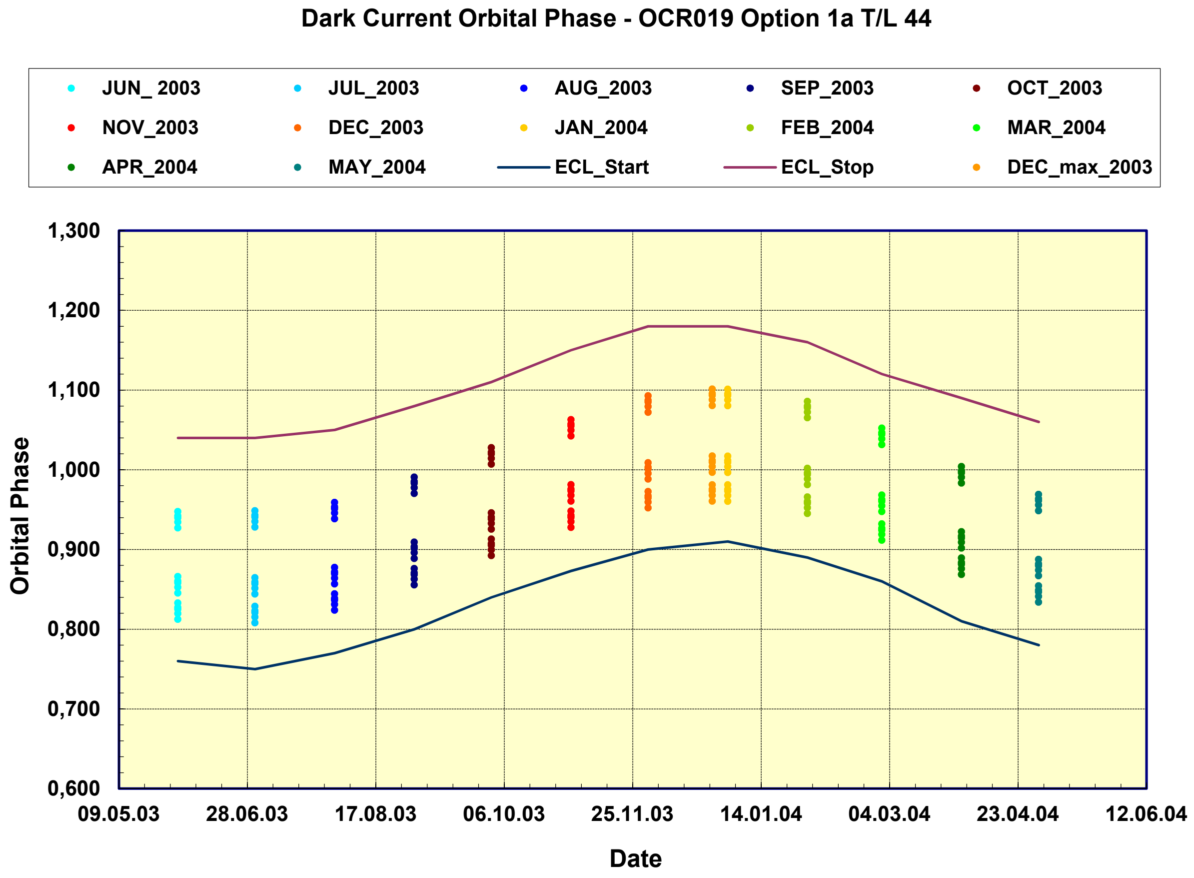


Fig. 7: Dark current block (5 dcc states each) start location in eclipse for the modified timeline 44 (option 1a) for a complete year showing the seasonal variation. For details see figure 4. Even when shifting the first block by a total of 3 limb_mesosphere states towards ANX, this block ends before ANX on December, 26th when the time intervall between eclipse start and ANX is shortest. This day is indicated as an additional data point close to the January 1st data point.

OCR_20: Short-term Modification of Limb Nighttime Tangent Height Range to Study NO2 Airglow

SCIAMACHY	**Operation Change Request**	OCR No: 20 Issue: A
Title: Short-term Modification of Limb Nighttime Tangent Height Range to Study NO_2 Airglow		
Description of Request: We request a change of tangent height range for eclipse limb mesosphere observations (Measurement category 26) from 75-150 km to 25-100 km for a limited period of time (a few days). The exact date/dates, when this temporary change is implemented are of minor importance. The request is based on the following scientific reason: The reaction of NO and O_3 is known to lead to the chemiluminescence of an excited NO_2 state covering a wide wavelength range. To date, there has only been little evidence that this airglow continuum can also be observed in the terrestrial nighttime stratosphere. The emission is thought to be the most intense in the upper stratosphere between about 40 and 50 km. By starting the limb scans at 25 km instead of 75 km, the relevant altitude range can be covered, and SCIAMACHY can make an important contribution to a better understanding of the terrestrial nightglow. This airglow feature, if identified in the SCIAMACHY observations may allow the retrieval of upper stratospheric NO profiles at night, e.g., during polar winter.		
Originator: Christian von Savigny, Heinrich Bovensmann	Date of Issue: 2004-06-17	Signature: CvS 2004-06-17
Assessment of SSAG (necessary for requests by scientists):		
SSAG: H. Bovensmann	Date: 2004-06-17	Signature: H. Bovensmann, 2004-06-17
Classification of OCR: D		
OCR Analysis (incl. Implementation Option) : This OCR can be implemented by modifying the Basic Profile no. 5 from -213848×10^{-6} rad (= -24.5° = 150 km) to a scanner elevation angle equivalent to about -25.4° (100 km). The modification is not affected by the planning cycles. Thus it is proposed to implement the modified Basic Profile no. 5 for a period of 7 days (100 orbits), starting with orbit 12572 (July 26th).		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 21/06/2004	Signature: via e-mail 21/06/2004
Approval of Proposed Implementation:		
Originator Approval: H. Bovensmann	Date: 2004-07-02	Signature: e-mail, H. Bovensmann, 2004-07-02
SSAG Approval: H. Bovensmann	Date: 2004-07-02	Signature: e-mail, H. Bovensmann, 2004-07-02

Decision / Approval: OCR shall be implemented as proposed.		
DLR Approval: Ch. Chlebek	Date: 2004-07-20	Signature: e-mail, Ch. Chlebek, 2004-07-20
Implementation by SOST: The Elevation Basic Profile no. 5 will be modified between orbits 12672-12772 (August 2nd – August 9th) from -213848×10^{-6} rad (= -24.5° = 150 km) to -221657×10^{-6} rad (= -25.4° = 100 km). Thus for a period of 7 days the limb_mesosphere altitude range will be 25-100 km. From orbit 12773 onwards, limb_mesosphere measurements will then start again at an elevation of 150 km and scan down to 75 km.		
SOST: E. Krieg, DLR-IMF	Date: 26/07/04	Signature: via e-mail, 26/07/04

OCR_21: Improvement of Limb/Nadir Matching for Subsolar Orbits

SCIAMACHY	Operation Change Request	OCR No: 21 Issue: A
Title: Improvement of Limb/Nadir Matching for Subsolar Orbits		
Description of Request: During orbits containing a subsolar measurement the matching between limb states (executed before the subsolar measurement) and nadir states (executed after the subsolar measurement) is not perfect. This results in regular data gaps during retrievals which combine limb and nadir data. Therefore it is proposed to optimise the limb/nadir matching for these orbits by a modification of the related timelines.		
Originator: S. Noël, A. Richter	Date of Issue: 16 Nov 2004	Signature: via e-mail S. Noël 16 Nov 2004
Assessment of SSAG (necessary for requests by scientists): An overall good match between limb and nadir measurements is one of the driving requirements for SCIA operations. Its stems from the scientific requirement to separate tropospheric and stratospheric concentrations by measurements, which is a one of the unique features of SCIAMACHY. An investigation to improve the limb/nadir matching for subsolar orbits is therefore recommended. Before final implementation the expected improvement in tropospheric retrieval needs to be assessed.		
SSAG: H. Bovensmann	Date: 29.11.2004	Signature: e-mail, 29.11.2004
Classification of OCR:		
OCR Analysis (incl. Implementation Option): The non-perfect limb/nadir matching in the second part of subsolar orbits is the result of the fact that such orbits are composed of 3 timelines. To establish the required strict time relation between the limb states in the timeline running prior to the subsolar event and the associated nadir states in the timeline after the subsolar event is not trivial. Option 1 (discarded): We propose to test an improved limb/nadir matching. The current timelines 49 and 52, which execute the subsolar state sscs01 and then a sequence of nadir and limb states without idle gaps are split into 2 timelines each (test set 09). Timelines 49 and 52 become timelines only executing the subsolar state sscs01. In the timeline header information the parameter *t/l_pad* exists, which is included in the timeline duration. This parameter was once introduced to separate consecutive timelines by a specified time period. The ENVISAT MPS does only process the timeline duration. Thus consecutive timelines are scheduled by MPS according to the selected *t/l_pad*. The t/l_pad of timelines 49 and 52 are set to 21.68 and 34.37 sec.		

OCR Analysis (continued):

The overall duration of timelines 49 and 52 is then equivalent to either a limb state or a nadir state, taking the timeline setup of the succeeding timeline and the cleanup of the preceeding timeline into account. Succeeding timelines get IDs 31 and 32. They are of type NF_FB, i.e. the first state starts when timelines 49 or 52 have run to completion. Additionally the timelines 48 and 51, preceeding subsolar timelines 49 and 52, must be defined as type NF_BF (currently NF_FL) to ensure that they end just when the subsolar timeline starts. This results in an idle gap at the end of the SO&C window of twice the current size (maximum size will occur in January and will amount to 100 sec).

Caused by the re-definition of timeline type the sequence of limb and nadir states have to be updated as well to ensure execution of the states with optimum PET settings. If the test proves to be successful, a complete new timeline set 34 for nominal operations has to be generated and uploaded. Provided that approval of the proposed option is received quickly, the test timelines can be included in the next planning cycle for execution in the second half of January 2005. In order to have a high probability to receive the measurement data in NRT for quick analysis, test timelines shall be executed for at least 5 days (1 orbit/day). The new timeline set 34 would then become operational end of February 2005/early March 2005 at the earliest.

Option 2:
Because of the conflict with OCLO measurents described below, a second implementation option is outlined here. It does not lead to a perfect limb/nadir matching as this always requires to fix the last state in the timeline preceeding the subsolar event w.r.t. to the subsolar state, but it improves the current situation.
Presently, pairs of timelines exist for limb/nadir sequence 1 (48/49) and 2 (51/52). In timeline 48 the state sequence ends with a nadir state and timeline 49 starts science measurements with a limb state. In timelines 51 and 52 this is reversed. Due to the

- seasonal variation of the time interval between end of SO&C window and subsolar event
- fact that timelines 48 and 51 are floating (NF_FL)
- durations of the timeline cleanup (48 & 51) and setup (49 & 52)
- duration of the subsolar state sscs01

the gap between two subsequent nadir or limb states right at the joint of timelines 48/49 and 51/52 amounts to 115-127 sec. For a perfect limb/nadir match this should either be 55.87 sec in the first case (the gap duration must be equivalent to a limb state) or 68.56 sec in the second case (nadir state).

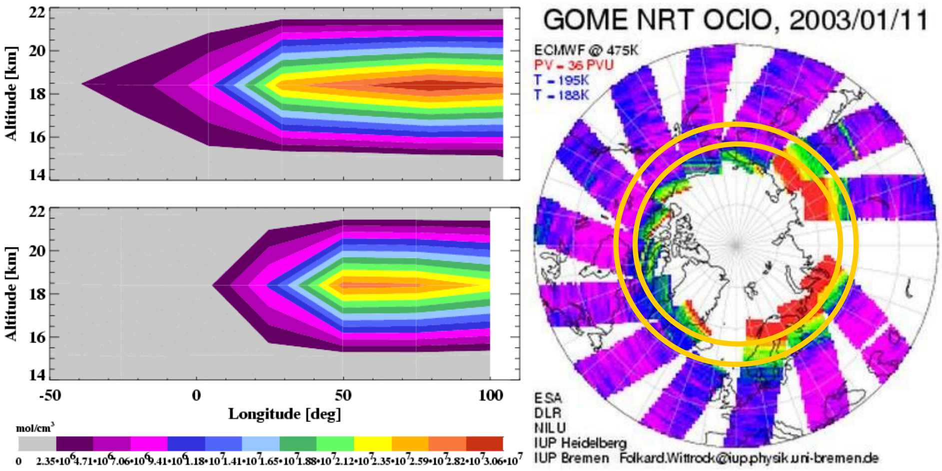
When we group timelines 48/52 and 51/49, nadir and limb states around the subsolar event are arranged such that the gap between nadir and limb states is 59-71 sec. This is much closer to the required durations. To execute sequence 1 (48/52) will result in a maximum shift of the first nadir state in timeline 52 as compared to the ideal position of 15 sec early February. The first limb state in timeline 49 will be shifted by only up to 6 sec. Limb states of the subsolar preceeding timeline should thus already overlap with the first nadir state of the succeeding timeline. Results of a test schdule for mid January is attached (figures 1-4). These figures prove the the option 2 concept.

Neither test timelines nor new timelines are required. In order to maintain the same level of limb/nadir matching in subsolar orbits when the moon is visible, it is required to run timeline 51 instead of 48 in all orbit_moon_daily_calibration_1 orbits (timeline starts with 3 limb states instead of 4 as in timeline 48). The approach described here can already be implemented in the next planning cycle starting January 15th.

SOST: : Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 25/11/2004 & 30/11/2004	Signature: via e-mail 25/11/2004 & 30/11/2004

Approval of Proposed Implementation:

The proposed implementation option 1 has the drawback that – due to our understanding - the idle time after the SO&C window will double in January, on cost of the first limb measurements after SO&C. The first 1-2 limb measurements after SO&C in January are very valuable ones, because OClO (indicator for the stratospheric chlorine activation and load) is only detectable in these measurements (SZA > 85°, see figure below). Assuming a slightly asymmetric polar vortex and the loss of 1-2 limb measurements at high latitudes with SZA>85° per day this will result in a significant loss of approx. 10-20% of all OclO measurements. It is therefore recommended to asses, if an implementation option exists, which assures that limb measurements will be executed in NH winter directly after SO&C.



Longitudinal Cross Section of SCIAMACHY OClO-profiles on 11.1.2003. Upper Left: 65,5° N (inner circle right),SZA= 89,5°.Lower Left: 62,2° N (outer ring right), SZA= 86,4°.Right: OClO-Slant Column and location of OclO profile cross section.

As a result of a telecon between H. Bovensmann/S. Noël and M. Gottwald (30/11/2004) it has been decided that option 2 seems to improve the situation in subsolar orbits significantly. It is therefore recommended to implement this solution.

Originator Approval: S. Noël,	Date: 30/11/2004	Signature: via e-mail 30/11/2004
SSAG Approval: H. Bovensmann	Date: 30/11/2004	Signature: via e-mail 30/11/2004

Decision / Approval:

The proposed option 2 shall be implemented.

DLR Approval: Ch. Chlebek	Date: 2004-12-01	Signature: e-mail, 2004-12-01

Implementation by SOST:

With the next planning cycle, subsolar orbits will be executed with the timeline sequences 48/52 and 51/49. This cycle will start in orbit 15044 (January 15th).

SOST: M. Gottwald, DLR-IMF	Date: 01/12/2004	Signature: via e-mail 01/12/2004

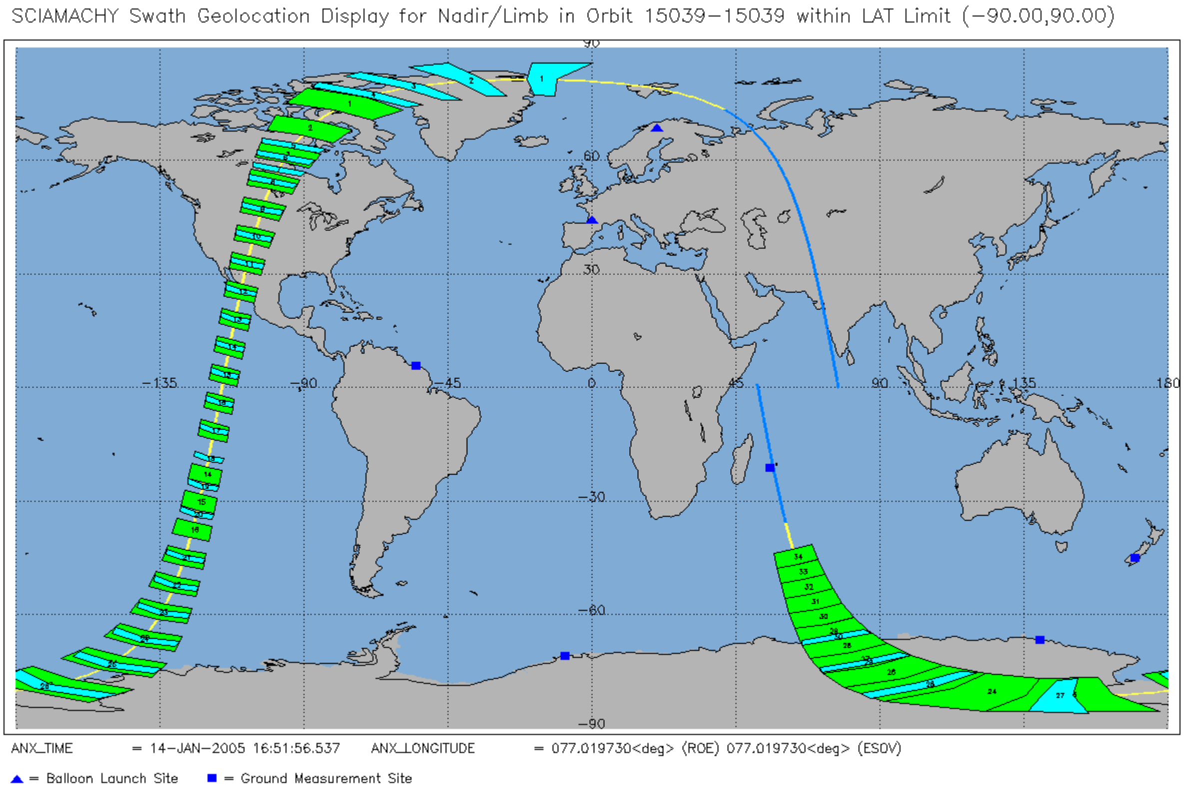


Fig. 1: Limb/nadir matching in a subsolar orbit with timeline sequence 48/49 (current status)

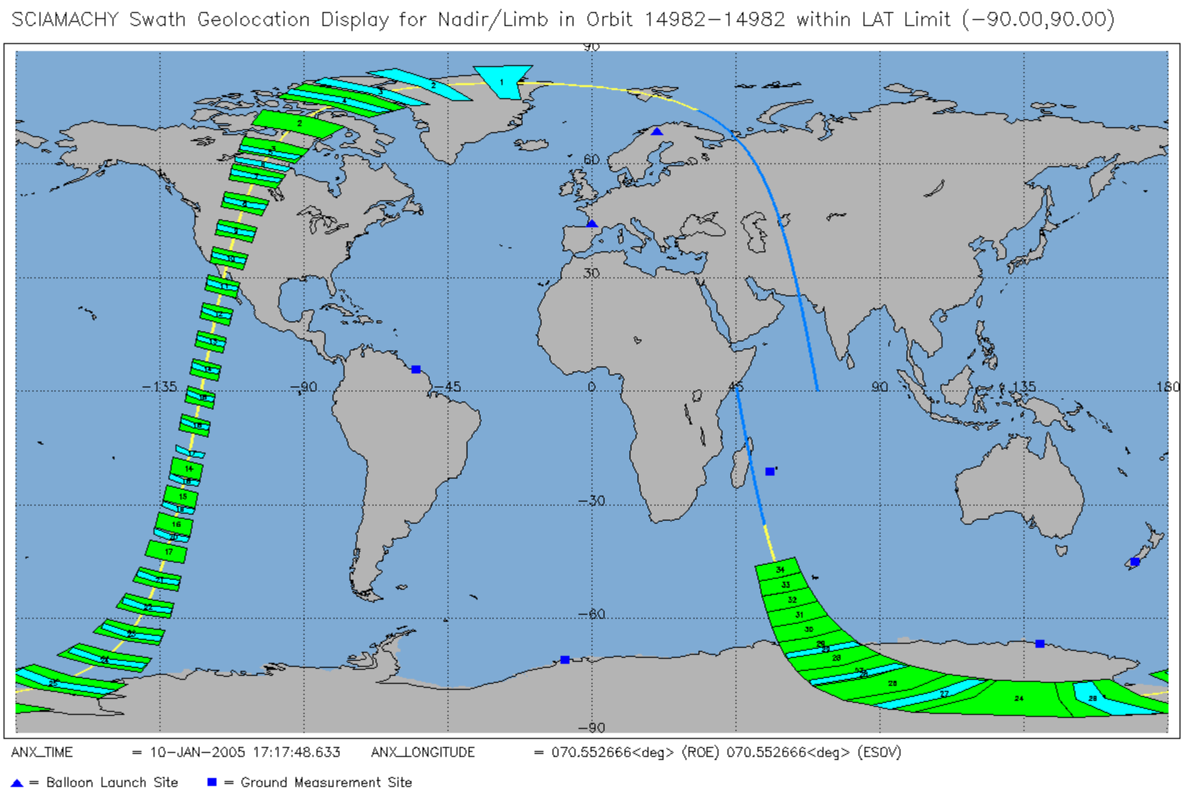


Fig. 2: Limb/nadir matching in a subsolar orbit with timeline sequence 51/52 (current status)

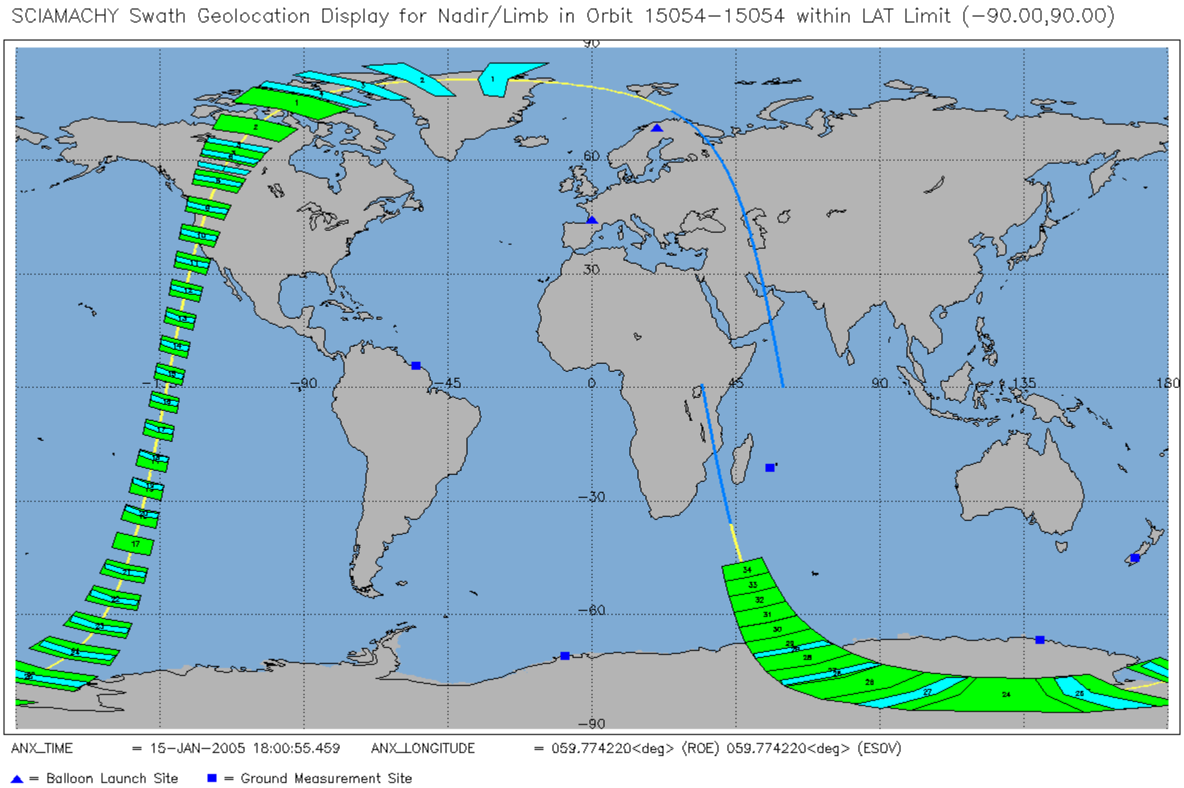


Fig. 3: Limb/nadir matching in a subsolar orbit with timeline sequence 48/52 (proposed option 2)

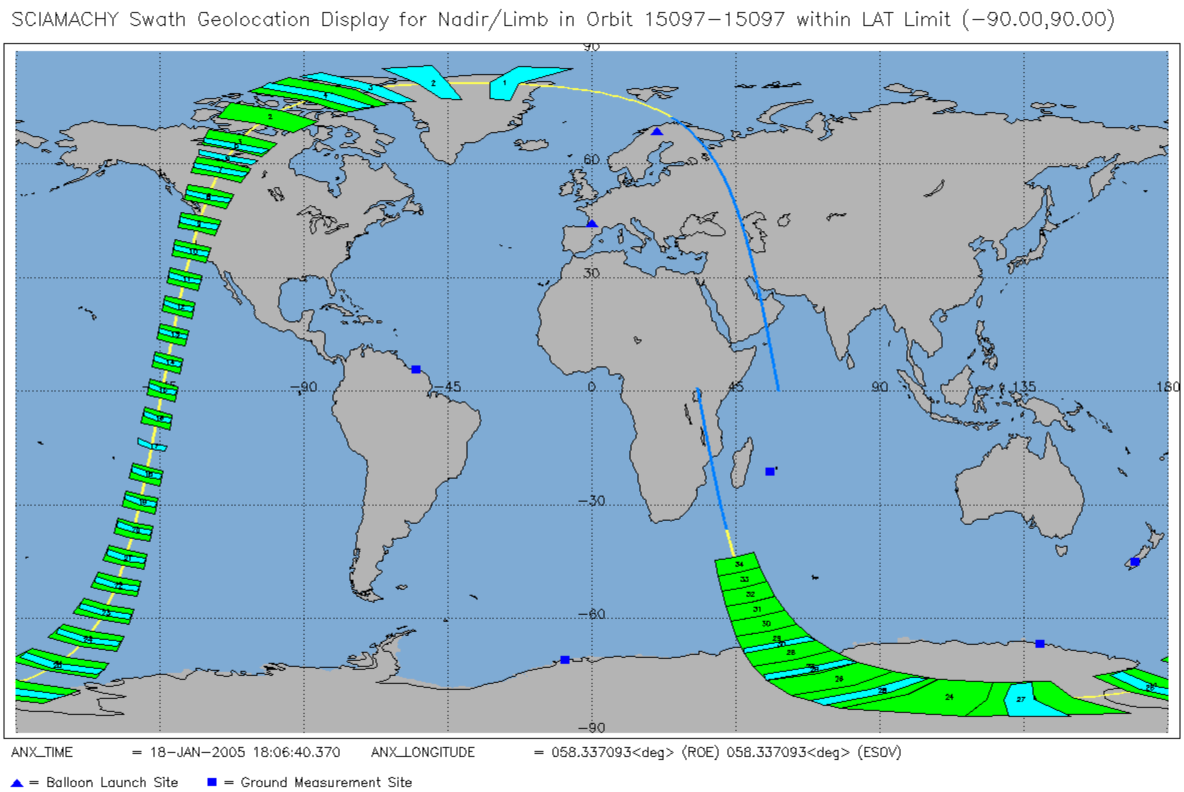


Fig. 4: Limb/nadir matching in a subsolar orbit with timeline sequence 51/49 (proposed option 2)

OCR_22: Vertical Sampling of 1.6 km During TROCCINOX-2 Campaign

SCIAMACHY	**Operation Change Request**	OCR No: 22 Issue: A

Title: Vertical Sampling of 1.6 km During TROCCINOX-2 Campaign

Description of Request:

End of January till end of February 2005 a large international campaign (TROCCINOX-2, http://www.pa.op.dlr.de/troccinox/) - involving the GEOPHYSICA and the DLR Falcon aircrafts and lead by DLR IPA - will be performed in Brazil to improve on the knowledge about lightning-produced NO_x (LNO_x) in tropical thunderstorms and to improve the current knowledge on the occurrence of other trace gases (including water vapour) and particles (ice crystal and aerosols) in the upper troposphere and lower stratosphere. SCIAMACHY data can significantly contribute to the TROCCINOX objectives by measuring above cloud NO2, H2O and particles (cirrus, liquid water, aerosol) in the tropical upper troposphere and lower stratosphere (UTLS). As the region of interest is characterised by large convective cloud systems which partially will be within the line-of-sight (LOS) of SCIAMACHY, this effect needs to be minimised to improve on the number of cloud free observations at the tropopause and to improve the knowledge of the cloud top height.

It is therefore proposed to double the vertical sampling (3.3 km -> 1.6 km) in limb mode for the time period of 29.1.2005 (start of TROCCINOX local flight in Brazil) until 22.2.2005 (last opportunity for local flights, dates are based on the schedule from Nov. 11, 2004, see attachment).

This mode was already successfully tested within OCR_14. In addition to more cloud free LOS observations, this data will help also to better quantify the impact of clouds on UTLS limb trace gas retrieval with the nominal vertical sampling, which is of importance for the projects ZTT, SCOUT and QUANTIFY.

Originator: C. Schiller (FZ Jülich), H. Schlager (DLR IPA), H. Bovensmann (IFE/IUP)	Date of Issue: 16 Dec 2004	Signature: via e-mail 16.12.2004 H. Bovensmann

Assessment of SSAG (necessary for requests by scientists):

The implementation of the change is recommended. It is recommended to check with data processing that the data can be processed up to level 1 within the NRT chain without complications.

SSAG: H. Bovensmann	Date: 16 Dec. 2004	Signature: via e-mail 16.12.2004 H. Bovensmann

Classification of OCR:

OCR Analysis (incl. Implementation Option):

This OCR can be implemented in 2 ways:
Option 1:
At the beginning of the campaign in orbit 15244, the limb step width is reduced by a factor 2 by modifying the scanner state table (parameter: relative_scan_profile_1_factor set from '6' to '3') of the wide swath limb states ID 28-33. In total 6 CTI parameter tables are required. At the end of the campaign in orbit 15603, this parameter is set back to its nominal value ('6'). For a period of 25 days all limb measurements are executed with the reduced step size. The maximum limb altitude at the end of the scans will be about 47 km.

Option 2:
The parameter modification described above is executed only for those orbits which lead over Brazil (typically 1 orbit/day). This requires to generate, submit to ESOC, uplink and execute 6 CTI tables with modified parameters each day and command SCIAMACHY back to the nominal limb step width with another set of 6 CTI tables each day. Within the time interval of the campaign this amounts to 25×6×2 CTI parameter tables. For a period of 25 days only the limb measurements in orbits passing over Brazil are reduced in step size. All other orbits show nominal limb measurements.

It is possible to finetune both options further. Since over Brazil only limb state ID 32 is executed, it might be preferred only to modify the relative_scan_profile_1_factor of this limb state, either in option 1 or option 2. In that case all limb states except state ID 32 would be nominal. If option 1 is fine-tuned this way (1b) then the limb states between latitude 30° and –60° are with a reduced step width for the duration of the campaign. Only 2 CTI parameter tables are required to implement OCR_22. If option 2 is finetuned (2b), then only limb state ID 32 in the orbits where ENVISAT’s sub-satellite track crosses Brazil has the modified step size. A total of 25×1×2 CTI parameter tables has to be handled.

No change in data rate is expected. How the data processors deal with modified limb step width within an orbit or between orbits is beyond our knowledge. The decision which option to implement should be made until January 15th at the latest in order to provide ample time for CTI parameter table generation, particularly if option 2 without finetuning is selected.

SOST: M. Gottwald, DLR-IMF	Date: 20/12/2004	Signature: via e-mail 20/12/2004

Approval of Proposed Implementation:

Option 1b (limb step width only reduced in limb state ID 32) is the preferred option from scientific point of view as it addresses the requested change, it will yield a consistent data set between 30°N and 60° S w.r.t. limb step width and it will allow to continue upper atmosphere observation in high southern latitudes at the end of the SH NLC season.

In case the operational processor (0-1, and 1-2) has problems to process orbits with changing limb step width within an orbit, also option 1(a) is acceptable.

Originator Approval: i.V. H. Bovensmann	Date: 4.1.2005	Signature: via e-mail 04/1/2005
SSAG Approval: H. Bovensmann	Date: 4.1.2005	Signature: via e-mail 04/1/2005

Decision / Approval:

The proposed option 1b shall be implemented.

DLR Approval: Ch. Chlebek	Date: 2005-01-14	Signature: via e-mail 2005-01-14

Implementation by SOST:		
Two CTI-files have been transmitted to ESOC for implementation of OCR_22 option 1b and restoration. The validity times are January 29th, 00:49 UTC = orbit 15244 (switch to reduced step height in state 32) and February 23rd, 02:41 UTC = orbit 15603 (switch to nominal step height in state 32).		
SOST E.Krieg	Date: 17.01.05	Signature: via e-mail 17.01.05

OCR_23: Improve Nadir Coverage for the Cabauw Campaign

SCIAMACHY	**Operation Change Request**	OCR No: 23 Issue: A

Title: Improve Nadir Coverage for the Cabauw Campaign

Description of Request:

From May 8 to June 30, a validation campaign at Cabauw/The Netherlands (long = 4.927° east, lat = 51.97° north) is scheduled. It focuses on tropospheric NO_2. In order to get additional information from SCIAMACHY nadir measurements, we request to adjust SCIAMACHY mission planning such that maximum coverage at Cabauw is obtained.

Originator: A. Piters/ KNMI	Date of Issue: 11 March 2005	Signature: e-mail 11 March 2005

Assessment of SSAG (necessary for requests by scientists):

The above given request is strongly supported.

SSAG: H. Bovensmann	Date: 22.3.2005	Signature: e-mail, 22.3.2005

Classification of OCR:

OCR Analysis (incl. Implementation Option):

This OCR could be implemented either by having nadir only measurements in orbits crossing Cabauw or by finetuning the execution of sequence 1/sequence 2 timelines. Since the first option would cause to get no limb measurements over the complete orbit, we propose to implement the second option, which has less impact on mission scenarios. In the second option, SOST will run the planning process twice. If Cabauw coverage orbits (see list attached) do not show a nadir state over central Netherlands, the planned limb/nadir sequence will be exchanged by using the timeline with the opposite limb/nadir sequence. This gives a high probability for Cabauw coverage. The only minor drawback would be that such orbits modify the sequence 1/sequence 2 pattern of nadir and limb states.

SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 11/03/2005	Signature: via e-mail 11/03/2005

Approval of Proposed Implementation:

Originator Approval: Option 2, A. Piters	Date: 14.3.2005	Signature: e-mail, 14.3.2005
SSAG Approval: Option2, H. Bovensmann	Date: 22.3.2005	Signature: e-mail, 22.3.2005

Decision / Approval:

The option 2 shall be implemented.

DLR Approval: Ch. Chlebek	Date: 23.3.2005	Signature: e-mail, 23.3.2005

<table>
<tr><td colspan="3"><u>Implementation by SOST:</u>

In the OSDFs for the period May 1st – May 31st and June 1st – June 30th the timelines in the Cabauw relevant orbits will include the limb/nadir sequence which provides maximum coverage at Cabauw. This is ensured by running SOST’s simulation of the mission planning schedule twice, identify cases where the sequence is unsuitable and exchange the sequence by the opposite limb/nadir sequence. Only for orbits in the monthly lunar visibility window (about 3 orbits each month) this approach is not feasible because only one sequence exists. Cabauw relevant orbits are those listed in the annex.

The planning for the period May 1st – May 31st following to this scheme is just under preparation and will be submitted to FOCC within the next two weeks.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 23/03/2005</td><td>Signature: via e-mail 23/03/2005</td></tr>
</table>

Orbits over Cabauw (Nadir Swath +/- 480 km)		
Time: 08-MAY-2005/30-JUN-2005		
Orbit	Longitude (ANX)	ANX (UTC)
16667	173.3	08-MAY-2005 10:26:47
16681	181.2	09-MAY-2005 09:55:10
16695	189.1	10-MAY-2005 09:23:33
16724	179.8	12-MAY-2005 10:00:55
16738	187.7	13-MAY-2005 09:29:18
16767	178.3	15-MAY-2005 10:06:40
16781	186.2	16-MAY-2005 09:35:03
16810	176.9	18-MAY-2005 10:12:25
16824	184.8	19-MAY-2005 09:40:48
16853	175.5	21-MAY-2005 10:18:10
16867	183.4	22-MAY-2005 09:46:33
16881	191.3	23-MAY-2005 09:14:56
16896	174.0	24-MAY-2005 10:23:55
16910	181.9	25-MAY-2005 09:52:18
16924	189.8	26-MAY-2005 09:20:41
16953	180.5	28-MAY-2005 09:58:03
16967	188.4	29-MAY-2005 09:26:25
16996	179.1	31-MAY-2005 10:03:47
17010	187.0	01-JUN-2005 09:32:10
17039	177.6	03-JUN-2005 10:09:32
17053	185.5	04-JUN-2005 09:37:55
17082	176.2	06-JUN-2005 10:15:17
17096	184.1	07-JUN-2005 09:43:40
17139	182.6	10-JUN-2005 09:49:25
17153	190.6	11-JUN-2005 09:17:48
17182	181.2	13-JUN-2005 09:55:10
17196	189.1	14-JUN-2005 09:23:33
17225	179.8	16-JUN-2005 10:00:55
17239	187.7	17-JUN-2005 09:29:18
17268	178.3	19-JUN-2005 10:06:40
17282	186.2	20-JUN-2005 09:35:03
17311	176.9	22-JUN-2005 10:12:25
17325	184.8	23-JUN-2005 09:40:48
17368	183.4	26-JUN-2005 09:46:33
17411	181.9	29-JUN-2005 09:52:18
17425	189.8	30-JUN-2005 09:20:41

Table: ENVISAT orbits with nadir ground pixel coverage at Cabauw

OCR_24: Improve Limb and Nadir Coverage for Sodankylä Ozone Campaign

SCIAMACHY	**Operation Change Request**	OCR No: 24 Issue: A
Title: Improve Limb and Nadir Coverage for Sodankylä Ozone Campaign		
Description of Request: During March 19, 2006 - April 15, 2006, a validation campaign aimed at satellite, balloon and groundbased observations of ozone under low-sun, high ozone conditions is performed at Sodankylä (67.368 °N, 26.633 °E), Finland. In order to get additional SCIAMACHY data, we request that SCIAMACHY mission planning is adjusted such that maximum coverage of limb as well as nadir states over Sodankylä is achieved.		
Originator: E.J. Brinksma/KNMI	Date of Issue: 10-10-2005	Signature:
Assessment of SSAG (necessary for requests by scientists): The documentation of the quality of the SCIAMACHY limb measurements under low-sun and high ozone conditions is an important validation activity, therefore it is recommended to investigate and if feasible, implement the requested change.		
SSAG: H. Bovensmann	Date: 4.11.2005	Signature: e-mail, 6.11.2005
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): This OCR is implemented in a way similar to OCR no. 23, i.e. SOST will run the planning process twice. If Sodankylä coverage orbits do not show a nadir state over this site, the planned limb/nadir sequence will be exchanged by using the timeline with the opposite limb/nadir sequence. This gives a high probability for Sodankylä nadir coverage which is, due to the limb/nadir matching, equivalent to limb coverage. The only minor drawback is that such orbits modify the sequence 1 / sequence 2 pattern of nadir and limb states.		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 07/11/2005	Signature: via e-mail 07/11/2005
Approval of Proposed Implementation:		
Originator Approval: Ellen Brinksma	Date: 17.11.2005	Signature: e-mail, 17.11.2005
SSAG Approval: H. Bovensmann	Date: 10.11.2005	Signature: e-mail, 10.11.2005
Decision / Approval: OCR shall be implemented as proposed by DLR-IMF.		
DLR Approval: Ch. Chlebek	Date: 22.11.05	Signature: e-mail, 22.11.2005

Implementation by SOST:

In the OSDF for the period March 1st - April 30th the timelines in the Sodankylä relevant orbits (between March 19th and April 15th) will include the limb/nadir sequence which provides maximum coverage at Sodankylä. This is ensured by running SOST's simulation of the mission planning schedule twice, identify cases where the sequence is unsuitable and exchange the sequence by the opposite limb/nadir sequence. Only for orbits in the monthly lunar visibility window or when running the monthly calibration this approach is not feasible. Sodankylä relevant orbits are those listed in the annex. Note that depending on the type of measurements planned for Sodankylä orbits might be added or deleted.

Due to the northern latitude of Sodankylä an ENVISAT overpass outside eclipse (related to the platform) occurs twice/day: One in the ascending part of the orbit and one in the descending part. In the descending part the limb/nadir matching fully applies, i.e. limb and nadir measurements exists with Sodankylä coverage. In the ascending part this is different. Until about March 25th sunrise occurs so late in the orbit that Sodankylä is not covered by the first nadir state in the timeline but one of the 4 limb states executed before the solar occultation state has its tangent point approx. over Sodankylä. From March 26th onwards the first or second nadir state coincides with the Sodankylä geolocation with one of the 4 limb states before sunsrise still having its tangent point over Sodankylä. Orbits with 'ascending' coverage occur in the evening, those with 'descending' coverage before noon.

The planning for the period March 1st - April 30th following to this scheme is just under preparation and will be submitted to RGT/FOCC within the next two weeks.

SOST: M. Gottwald, DLR-IMF	Date: 25/01/2006	Signature: via e-mail 25/01/2006

Orbit	Part of Orbit	ANX longitude (deg)	ANX Time (UTC)
21175	descending	198,46	19.03.2006 08:46
21181	ascending	47,56	19.03.2006 18:49
21189	descending	206,36	20.03.2006 08:14
21195	ascending	55,46	20.03.2006 18:18
21204	descending	189,12	21.03.2006 09:23
21209	ascending	63,37	21.03.2006 17:46
21218	descending	197,02	22.03.2006 08:51
21224	ascending	46,12	22.03.2006 18:55
21232	descending	204,92	23.03.2006 08:20
21238	ascending	54,03	23.03.2006 18:23
21247	descending	187,68	24.03.2006 09:29
21252	ascending	61,93	24.03.2006 17:52
21261	descending	195,58	25.03.2006 08:57
21267	ascending	44,68	25.03.2006 19:01
21275	descending	203,49	26.03.2006 08:26
21281	ascending	52,59	26.03.2006 18:29
21290	descending	186,24	27.03.2006 09:35
21295	ascending	60,49	27.03.2006 17:58
21304	descending	194,15	28.03.2006 09:03
21309 *	ascending	68,40	28.03.2006 17:26
21310 *	ascending	43,25	28.03.2006 19:07
21318	descending	202,05	29.03.2006 08:31
21324	ascending	51,15	29.03.2006 18:35
21333	descending	184,80	30.03.2006 09:40
21338	ascending	59,06	30.03.2006 18:03
21347	descending	192,71	31.03.2006 09:09
21352 *	ascending	66,96	31.03.2006 17:32
21353 *	ascending	41,81	31.03.2006 19:12
21361	descending	200,61	01.04.2006 08:37
21367	ascending	49,71	01.04.2006 18:41
21375 *	descending	208,52	02.04.2006 08:05
21376 *	descending	183,37	02.04.2006 09:46
21381	ascending	57,62	02.04.2006 18:09
21390	descending	191,27	03.04.2006 09:14
21395	ascending	65,52	03.04.2006 17:37
21404	descending	199,18	04.04.2006 08:43
21410	ascending	48,28	04.04.2006 18:46
21418	descending	207,08	05.04.2006 08:11
21424	ascending	56,18	05.04.2006 18:15
21433 (moon, no coverage)	descending	189,83	06.04.2006 09:20
21438	ascending	64,09	06.04.2006 17:43
21447	descending	197,74	07.04.2006 08:49
21453	ascending	46,84	07.04.2006 18:52
21461	descending	205,64	08.04.2006 08:17
21467	ascending	54,74	08.04.2006 18:21
21476	descending	188,40	09.04.2006 09:26
21481	ascending	62,65	09.04.2006 17:49
21490	descending	196,30	10.04.2006 08:54
21496	ascending	45,40	10.04.2006 18:58
21504	descending	204,21	11.04.2006 08:23
21510 (monthly calibration, no coverage)	ascending	53,31	11.04.2006 18:26
21519	descending	186,96	12.04.2006 09:32
21524	ascending	61,21	12.04.2006 17:55
21533	descending	194,86	13.04.2006 09:00
21539	ascending	43,97	13.04.2006 19:04
21547	descending	202,77	14.04.2006 08:28
21553	ascending	51,87	14.04.2006 18:32
21562	descending	185,52	15.04.2006 09:37
21567	ascending	59,77	15.04.2006 18:00

* Sodankylä lies between both orbits

Table: ENVISAT orbits with nadir or limb ground pixel coverage at Sodankylä between March 19, 2006 and April 15, 2006

OCR_25: Extended Moon Observations

SCIAMACHY	Operation Change Request	OCR No: 25 Issue: A

Title: Extended Moon Observations

Description of Request:

Extend the coverage in ASM and ESM angle during Moon observations for two months, covering an as large as possible part of the total clear field of view in limb. It is essential that elevation scans over the Moon are made during the observations, as in state ID 54 (mos01) Moon_Scanning.

This will allow in-flight **verification of the scanner calibration** (excluding polarisation), and in-flight **absolute calibration of the limb radiance** (to an accuracy of better than 3.5%) and ASM and ESM **diffuser BSDF calibration** (to an accuracy of better than 2%), over 32 wavelength bands between 350 nm and 2.5 micrometer, with tracability to NIST.

For more details see Appendix A.

Originator: Ralph Snel, SRON	Date of Issue: 30 March 2006	Signature:

Assessment of SSAG (necessary for requests by scientists):

The validation of the Level 1 data quality, especially w.r.t. absolute calibration of Limb radiances and ASM/ESM diffuser BSDF is even 4 years after launch a topic not covered satisfactorily. The new evolvement within the ROLO project (Kieffer and Stone, 2005, www.moon-cal.org/) to establish an accurately calibrated lunar radiance database can help to improve the quality of SCIAMACHY in-flight calibration. It is therefore recommended to investigate the proposed modification of state ID 54. For a final decision the impact on lunar occultation measurements needs to assessed too.

SSAG: H. Bovensmann	Date: 5.4.2006	Signature: e-mail 5.4.2006

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

The idea is to implement OCR_25 as a specific test campaign. Envisaged execution of the measurements is in two monthly visibility periods between July and October. In these periods no occultation measurements can be performed since moonrise occurs on the dayside, i.e. no conflict between science occultation and calibration measurements exists. Which months to use depends on which cycle (July/August or September/October) is due for planning after approval of the OCR.

The implementation requires definition of a test state and of a test timeline.

State:
It is planned to modify state 54 such that it can start as early as possible and end as late as possible in the MO&C window. Currently state 54 has a duration of 15.57 sec with a SDPU duration (measurement phase) of 12 sec. The nominal scan width amounts to ±0.33° with a scan duration of 2 sec.
The width of the MO&C window between an altitude of 17.2 and the edge of the limb TCFoV amounts to 124-182 sec.

OCR Analysis (continued):

Because only one test state can be defined, we have to assume the lower limit of 124 sec. This interval must be reduced however, because tracking of the moon in elevation is complicated by the variable elevation rate and confusion of the SF at low altitudes when the moon rises on the dayside (in azimuth the moon is tracked via the Sun Follower). In the MO&C window the elevation rate varies between –0.059°/sec and –0.041°/sec depending whether the moon rises in flight direction (azimuth = 0°) or at the left/right edges of the limb TCFoV (azimuth = ±44°). Several state implementation options exist.

Option 1: Since we follow the lunar disk with a constant rate which is calculated from the positions at the start of the measurement phase, we have to ensure that the vertical scan always covers the complete lunar disk. With a lunar diameter of 0.50°-0.55° and a scan width of ±0.33° we propose to accept a vertical shift of the scanned area of about 0.04° at maximum leaving a margin of only a few 0.01°. This translates into a maximum measurement duration of 80 sec, starting at an altitude of 150 km. The stop altitude is always above 300 km. Option 1 leaves the scan motion unmodified. Scanner state table no. 54 and state duration table need modifications

Option 2: In order to improve the scan margin and to increase the duration of the moon observation period the modification of the scan via the relative scan profile is also possible. Option 1 uses relative profile 4 to produce a triangular motion of 2 sec over the upper moon half, which is inverted at each subsequent scan thus resulting in a centred scan over the complete moon of total 4 sec. A similar total scan with different width can be accomplished by using linear relative scan profile 5, centring it and again inverting the subsequent san. This would result in a first linear scan starting at the lowest scan elevation and scanning in 2 sec over the moon disk to the highest scan elevation and then reversing the scan direction in the subsequent 2 sec period. The scan width would be ±0.423°. Modified parameter tables would include scanner state table no. 54 and state duration table. Bonus of option 2 is that the margin is wider (about 0.1° on each side), i.e. the state can start earlier (at an altitude of 100 km) and last longer (95 sec). Draw-back is however that the signal would drop by about 30%. For the time of the test campaign this modified state would also replace the lunar calibration & monitoring measurements.

Option 3: In order to compensate for the signal reduction of option 2 the angular variation of relative profile 5 could be reduced (note: This profile is currently used in final flight state ID 38. To still produce the identical maximum left position of state ID38 the reduction of the angular variation of relative scan profile 5 would have to be balanced by changing the relative scan profile factor in table scanner state parameter for state ID38 accordingly). The optimum range of reduction of the scan speed (scan width) should be defined by the originator of OCR_25 (and signal experts). For the time of the test campaign this modified state would also replace the lunar calibration & monitoring measurements.

Option 1 is most straightforward. Option 2 requires a change in the evaluation strategy and option 3 even impacts another final flight state and needs to be adjusted accordingly.

Option 1 modification (after discussion with R. Snel): Since complete coverage of the lunar disk is not a prerequisite for the implementation of the measurements (incomplete coverage at the end of the state can be flagged by analysing the PMD signal), the vertical range has been extended slightly. Now option 1 assumes a starting altitude of about 100 km and a measurement duration of 92 sec.

Timeline:
In timeline set 9 a timeline 13 is defined which executes state 54 modified as described above. Timeline header information (moon fixed event) will be defined accordingly.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 25/04/2006 and 27/04/2006	Signature: via e-mail 25/04/2006 and 27/04/2006
Approval of Proposed Implementation: The modified option 1 describes the preferred implementation.		
Originator Approval: R. Snel, SRON	Date: 27/04/2006	Signature: via e-mail 27/04/2006
SSAG Approval: H. Bovensmann	Date: 15/05/2006	Signature: via e-mail 15/05/2006
Decision / Approval: OCR shall be implemented as proposed by DLR-IMF.		
DLR Approval: Ch. Chlebek	Date: 9.6.2006	Signature: e-mail, 9.6.2006
Implementation by SOST: The modified option 1 will be implemented in the monthly lunar visbility windows in July and August (orbit 22734-22821, 6-12 July and orbit 23158-23236, 4-10 August). No lunar occultation would have been executed in these periods since the moon rises on the dayside. The following temporary changes to state ID54 will become effective. States: Scanner state parameter table (duration of phase 3 = 90000 msec and repetition of relative profile of phase 3 = 44) State duration table (SDPU duration = 1472 BCPS, WM = 23528 cts, state duration = 24469 cts and WSR = 179 cts) Timelines: Two test timelines (set 09, sub-ID 01) are required. Timeline 13 will execute the modified state 54 and test timeline 42 will run a single nadir state (ID06). Timeline 42 is scheduled just prior to timeline 13 in order to minimise the idle phase. When the August lunar window has come to an end, the final flight settings of state 54 will be re-established. If analysis of the moon test measurements would suggest a further campaign in September and October (these months are still without moon occultations), the modified settings would be maintained.		
SOST: M. Gottwald, E. Krieg. DLR-IMF	Date: 30/05/2006	Signature: via e-mail 30/05/2006

Appendix A

Kieffer and Stone (Astron. J. 129:2887-2901, 2005 June) have published a model capable of predicting integrated Moon radiance in 32 filter bands ranging between 350 nm and 2.4 micrometer. The model allows prediction of the irradiance of the Moon for any phase within a week around full Moon, but excluding the hours just around full Moon. Effects of libration, and of maria and highlands, are taken into account. The average residual between the model and the measurements (over 80000) is less than 1%, and the model is actively being used in lunar calibration of several spacecraft instruments and can track sensor response changes at the 0.1% level.

Absolute calibration is currently tied to Vega and photometric standard stars, but efforts are underway to tie the radiometric calibration to the scale of the National Institute of Standards and Technology (NIST). Deviations between the model and a scaled laboratory spectrum of the reflectance of an apollo sample of Moon soil are about 3.5% RMS. As more data become available the calibration will improve.

A preliminary investigation into the use of this model for possible in-flight calibration of SCIAMACHY has shown promising results, with RMS differences between observed scia lunar radiances and the model of better than 2% (after the use of a filter band specific scaling factor) for those wavelengths where scia is most stable. This indicates that relative radiometric calibration for scia limb radiance can be derived from Moon measurements at this level.

When instead of the lunar radiance the lunar albedo is used, thus combining scia limb measurements of lunar radiance and solar irradiance, it is possible to derive the BSDF of the on-board diffusers relative to the Moon albedo. Since the lunar albedo is spectrally bland, with very shallow and broad (hundreds of nm) spectral features, this allows an excellent verification of the radiometric calibration of SCIAMACHY. Assuming the comparison between the lunar irradiance model and the apollo soil sample is representative and the errors for the 32 wavelength bands are randomly distributed, this would allow derivation of an in-flight diffuser BSDF with an absolute overall error of better than 1%.

The need for extra measurements

Over a month, the Moon traverses the entire total clear field of view (TCFoV) of SCIAMACHY, while it changes phase and thus intensity and colour. It was found that the calibration of the scan mirrors does not cover the entire TCFoV, and that an extrapolation of the angular range covered by the on-ground measurements was needed. Currently, there are a few hundred useful lunar measurements, which allows investigation of correlation between the residuals and any parameters affecting the model and the measurements, such as lunar phase, Sun-Earth distance, Moon-Earth distance, libration angles, time (instrument degradation), and scan angles. Some of these parameters correlate with eachother as well, complicating *ad hoc* improvements of the residuals. Depending on wavelength, the largest correlations were with:

- time (in particular in the UV, where there is known degradation)
- ESM angle
- ASM angle

and with some of the parameters of the lunar model, which are beyond our control.

This suggests that, firstly, there is instrument degradation, and secondly, the scanner calibration is not sufficient for these Moon measurements. These two aspacts may very well be related, since it is the ESM mirror which is degrading fastest, which implies that the scanner calibration angular dependence is changing as well.

A dedicated effort to measure the scanner calibration as a function of ESM and ASM angle is possible using the Moon as a predictable radiance source. Since the lunar model is for the radiance integrated over the entire lunar disk (and thus by definition irradiance, but not in the meaning normally applied for SCIAMACHY, i.e. using the on-board diffuser), the observations of the Moon must be performed using a scanning motion as in state ID 54.

State 54 is executed when the Moon is well above the atmosphere, and runs for a duration of only 12 seconds. During this time, the Moon traverses a small part of the TCFoV, mostly in elevation. The azimuth range of the TCFoV is covered over the Moon visibility period, typically about a week, from -40 to +40 degrees, with normally one observation per day, resulting in a few widely spaced azimuth angles covered during that visibility period.

In order to better cover the TCFoV, longer measurements than those done in state 54 could be done, possibly also starting at lower altitude, giving better elevation coverage, and more frequent measurements than once a day, e.g. every orbit during which the Moon is visible, resulting in better azimuth coverage.

Since the instrument is slowly changing, one period of intensive measurements is better than a longer period of dispersed measurements, thus providing a snap-shot of the scanner calibration. Since the lunar model does not yield accurate predictions too close to full Moon, a gap in the azimuth coverage will result. Repetition of the measurements in the next moon visibility period will most likely have the gap at a different azimuth (TBC by SOST), suggesting that two Moon visibility periods should be observed with the proposed type of coverage.

Analysis of the observations

State 54 yields scans over the Moon, which allow simple calculation of the spatially integrated intensity of the Moon. These Moon irradiance measurements are corrected for known instrumental effects such as memory effect, non-linearity, dark signal, scan-angle dependent relectivity of the scan mirrors, etc. The resulting signal is normalised to a reference Sun-Moon distance and a reference Moon-ENVISAT distance, and integrated over the spectral bands used in the lunar irradiance model. The ratio of the resulting scia band intensity with that predicted by the lunar model is the in-flight radiometric calibration of SCIAMACHY in those 32 bands. Systematic variation of the ratio with scan angle would suggest scanner calibration problems.

If the scia Moon observations are normalised with the corresponding Sun over diffuser measurement (either ESM or ASM), and the lunar model is used to output disk-averaged reflectances rather than radiances, the ratio between the scia integrated filter bands and the lunar model values can be used to derive the in-flight BSDF of the diffuser used for the solar measurement.

Since these measurements can be obtained totally independent from on-ground calibration or Earth radiance measurements, they provide an independent means for validating SCIAMACHY level 1 spectra.

OCR_26: Increase Number of Subsolar Pointing Measurements

SCIAMACHY	**Operation Change Request**	OCR No: 26 Issue: A
Title: Increase Number of Subsolar Pointing Measurements		
Description of Request: Subsolar pointing measurements (state 53) have proven to be better suitable for long-term monitoring than fast sweep measurements (state 60). Therefore it is requested to increase the number of subsolar pointing measurements from (currently) one measurement per month to at least one or two measurements per week (this should be synchronized with the LLI related operations update). The number of fast sweep measurements may then be reduced, but at least 1 measurement per month should be kept to continue the existing monitoring time series.		
Originator: S. Noël, SOST-IFE	Date of Issue: 04-Apr-2006	Signature: e-mail 4 April 2006
Assessment of SSAG (necessary for requests by scientists): As already discussed at the last SSAG, the proposed change is recommended for implementation. LLI issues needs to be taken into account by SOST.		
SSAG: H. Bovensmann	Date: 5.4.2006	Signature: e-mail, 5.4.2006
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): After having decided on a modification of the mission scenarios due the LLI usage in an extended mission, a new timeline set will be defined and uploaded for nominal operations. This will exchange the sub-solar states 53 and 60 with state 53 becoming the standard sub-solar state to be executed most frequently (timelines 24-32, 49, 52, 56; rate depends on the selected LLI approach) and state 60 to be executed only 1/month during the monthly calibration.		
SOST: M. Gottwald, DLR-IMF	Date: 25/04/2006	Signature: via e-mail 25/04/2006
Approval of Proposed Implementation:		
Originator Approval: S. Noel	Date: 5.7.2006	Signature: e-mail S. Noel, 5.7.2006
SSAG Approval: H. Bovensmann	Date: 5.7.2006	Signature: e-mail S. Noel, 5.7.2006
Decision / Approval: The OCR shall be implemented as proposed. (see also minutes of LLI telecon, e-mail M. Gottwald, 23.6.2006)		
DLR Approval: Ch. Chlebek	Date: 12.7.2006	Signature: e-mail Ch. Chlebek, 12.7.2006

Implementation by SOST: A new timeline set 34 has been defined and will become active in orbit 23978 on October 1st, 2006 (FFT 061001). In all set 34 timelines executing the daily and weekly sub-solar measurements, state ID 53 is used instead of state ID 60. In the monthly sub-solar measurements, state ID 60 and 53 are exchanged. The rate of sub-solar measurements is defined in OCR_27 in response to the need to reduce NCWM cycle in an extended ENVISAT/SCIAMACHY mission.		
SOST: M. Gottwald, DLR-IMF	Date: 17/07/2006	Signature: via e-mail 17/07/2006

OCR_27: Reduce Number of Subsolar Measurements

SCIAMACHY	**Operation Change Request**	OCR No: 27 Issue: A
Title: Reduce Number of Subsolar Measurements		
Description of Request: Because of the extension of the ENVISAT/SCIAMACHY mission, the current mission scenarios would exceed the NCWM in-flight budget in the second half of 2008. With an 'use-as-is' approach for subsolar measurements, end of 2010 the number of executed NCWM cycles would even amount to 40% above the in-flight limit. Since the NCWM has a safety margin factor of 1, no tradeoffs can be made as is the case for the NDFM and APSM (see summary of the LLI telecom, distributed via e-mail on June 23rd, 2006). At a telecom on June 21st, 2006 it was decided to reduce subsolar measurements to a rate of two per week. These measurements shall execute the subsolar pointing state (see also OCR_26). Subsolar fast sweep measurements shall be scheduled with a minimum rate of 1/month and a maximum rate, if feasible from a timeline definition point of view, of 1/week..		
Originator: M. Gottwald, DLR-IMF	Date of Issue: 17/07/2006	Signature: e-mail 17/07/ 2006
Assessment of SSAG (necessary for requests by scientists): As already recommended for OCR-26, sub-solar pointing measurements needs to be executed once to twice a week and sub-solar fast sweep monthly.		
SSAG: H. Bovensmann	Date: 24/08/2006	Signature: e-mail, 24.8.2006
Classification of OCR: D		
OCR Analysis (incl. Implementation Option): The new mission scenario w.r.t. subsolar measurements will be implemented via planning only. In the generation of the OSDF on SOST side it will be ensured that only two subsolar pointing measurements are executed each week in the assigned subsolar calibration opportunity. Generation of timeline set 34 has also shown that a subsolar fast sweep measurement with a rate of 1/week would require a complete rework of the assignment of timeline phases to timeline Ids. Therefore the rate of subsolar fast sweep measurements will be set to 1/month as part of the monthly calibration.		
SOST: M. Gottwald, DLR-IMF	Date: 17/07/2006	Signature: via e-mail 17/07/2006
Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, DLR-IMF	Date: 24/08/2006	Signature: via e-mail 24/08/2006
SSAG Approval: H. Bovensmann	Date: 24/08/2006	Signature: e-mail, 24.8.2006

Decision / Approval: The OCR shall be implemented as proposed.		
DLR Approval: Ch. Chlebek	Date: 25.8.2006	Signature: via telephone 25.8.2006
Implementation by SOST: The OSDF for the planning period October 1st – October 31st (orbit 23976-24419) will take the reduced subsolar rate for the first time into account. In this OSDF a subsolar calibration is performed every 4th day, i.e. with the required rate of 2 per week. By uploading the new timeline set 34 it is ensured that these measurements use the subsolar pointing state (see OCR_26) while the subsolar fast sweep state is only executed as part of the monthly calibration.		
SOST: M. Gottwald, DLR-IMF	Date: 24/08/2006	Signature: via e-mail 24/08/2006

OCR_28: Improve Limb and Nadir Coverage for Cabauw Dandelions-2 Campaign

<table>
<tr><td rowspan="2">SCIAMACHY</td><td rowspan="2">Operation Change Request</td><td>OCR No: 28</td></tr>
<tr><td>Issue: A</td></tr>
<tr><td colspan="3">Title: Improve Limb and Nadir Coverage for Cabauw Dandelions-2 Campaign</td></tr>
<tr><td colspan="3"><u>Description of Request:</u>
During Sep 1 – Sep 30, 2006, a validation campaign aimed at satellite and ground-based observations of total ozone and total NO2 will be performed at Cabauw, the Netherlands (51.971 °N, 4.972 °E).
In order to get additional SCIAMACHY data, we request that SCIAMACHY mission planning is adjusted such that maximum coverage of limb as well as nadir states over Cabauw is achieved. This can be done in a similar fashion to what was done previously for the SAUNA and Dandelions-1 campaigns.</td></tr>
<tr><td>Originator: E.J. Brinksma/KNMI</td><td>Date of Issue: 31-7-2006</td><td>Signature: via e-mail 31-7-2006</td></tr>
<tr><td colspan="3"><u>Assessment of SSAG (necessary for requests by scientists):</u>
From SSAG point of view the implementation of the OCR (maximum coverage of Cabauw) is recommended.</td></tr>
<tr><td>SSAG:
H. Bovensmann</td><td>Date:
14-8-2006</td><td>Signature: e-mail, 14-8-2006,
H. Bovensmann</td></tr>
<tr><td colspan="3">Classification of OCR: D</td></tr>
<tr><td colspan="3"><u>OCR Analysis (incl. Implementation Option):</u>
This OCR is implemented in a way similar to OCR no. 23 and 24, i.e. SOST will run the planning process twice. If Cabauw coverage orbits do not show a nadir state over this site, the planned limb/nadir sequence will be exchanged by using the timeline with the opposite limb/nadir sequence. This gives a high probability for Cabauw nadir coverage which is, due to the limb/nadir matching, equivalent to limb coverage. The only minor drawback is that such orbits modify the sequence 1 / sequence 2 pattern of nadir and limb states.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 01/08/2006</td><td>Signature: via e-mail
01/08/2006</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
E.J. Brinksma/KNMI</td><td>Date: 21-8-2006</td><td>Signature: via e-mail 21-8-2006</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date: 14.8.2006</td><td>Signature: via e-mail
14.8.2006</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>
OCR shall be implemented as proposed by DLR-IMF.</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date: 14.8.2006</td><td>Signature: 14.8.2006</td></tr>
</table>

Implementation by SOST:		
In the OSDF for the period September 1st – September 30th the timelines in the Cabauw relevant orbits include the limb/nadir sequence which provides maximum coverage at Cabauw. This is ensured by having run SOST's simulation of the mission planning schedule twice, having identified cases where the sequence was unsuitable and exchanged the sequence by the opposite limb/nadir sequence. In total 25 orbits have been identified with fair to good Cabauw coverage. They are listed in the annex. On 5 days the subsatellite track is such that no Cabauw overpass occurs. The planning for the period September 1st – September 30th has been updated accordingly (original OSDF 33_19 was sent to RGT end of July) on August 21st by submitting the modified OSDF 33_20 to RGT.		
SOST: M. Gottwald, DLR-IMF	Date: 24/08/2006	Signature: via e-mail 24/08/2006

Orbits over Cabauw (Nadir Swath +/- 480 km)		
Time: 01-SEP-2006/30-SEP-2006		
Orbit	Longitude (ANX)	ANX (UTC)
23552	177.6	01-SEP-2006 10:09:33
23566	185.5	02-SEP-2006 09:37:56
23595	176.2	04-SEP-2006 10:15:18
23609	184.1	05-SEP-2006 09:43:41
23623	192,0	06-SEP-2006 09:12:04
23638	174.7	07-SEP-2006 10:21:03
23652	182.6	08-SEP-2006 09:49:26
23666	190.6	09-SEP-2006 09:17:49
23681	173.3	10-SEP-2006 10:26:48
23695	181.2	11-SEP-2006 09:55:11
23709	189.1	12-SEP-2006 09:23:34
23738	179.8	14-SEP-2006 10:00:55
23752	187.7	15-SEP-2006 09:29:18
23781	178.3	17-SEP-2006 10:06:40
23795	186.2	18-SEP-2006 09:35:03
23824	176.9	20-SEP-2006 10:12:25
23838	184.8	21-SEP-2006 09:40:48
23852	192.7	22-SEP-2006 09:09:11
23867	175.5	23-SEP-2006 10:18:10
23881	183.4	24-SEP-2006 09:46:33
23895	191.3	25-SEP-2006 09:14:56
23910	174,0	26-SEP-2006 10:23:55
23924	181.9	27-SEP-2006 09:52:18
23938	189.8	28-SEP-2006 09:20:41
23967	180.5	30-SEP-2006 09:58:03

Table: ENVISAT orbits with nadir ground pixel coverage at Cabauw

OCR_29: Investigation of Extra-Misalignment Contributions in Pitch, Roll and Yaw

SCIAMACHY	**Operation Change Request**	OCR No: 29 Issue: A

Title: Investigation of Extra-Misalignment Contributions in Pitch, Roll and Yaw

Description of Request:

In a tbd time period several special states shall be implemented and executed to gain further knowledge
about extra misalignment of the optical axis. It is proposed to use primarily the Sun in the SO&C-window above the atmosphere as target. This is to exclude as good as possible any effects from the atmosphere on the apparent position of the Sun. In different states the sequence of phases shall be varied whereby the phases shall perform sun-measurements while tracking the Sun in correction 8 (SC-AOCS = prediction), correction 4 (SFS-acquisition), correction 9 (SC-AOCS = improved prediction), correction 6 (SFS-pointing) and in addition scanning over the Sun. This is to permit to define the centre of the Sun using developed algorithms. Comparable measurements for ESM and ASM shall be executed.

It is expected, that the change of the mirror position for the ESM at acquisition will provide results as found in the recent model analysis. For the ASM-acquisition the yet unexplained jump at execution of nominal states 47 and 49 might be different in case it is an impact of the atmosphere. Otherwise an azimuth jump of similar size would be a hint for a potential ASM offset.

Additionally the proposed sequence of correction modes may yield information about the impact of the sun angular rates. For details see the annex.

Originator: E. Krieg/DLR-DFD	Date of Issue: 14.02.2007	Signature: email 14.02.2007

Assessment of SSAG (necessary for requests by scientists):

As the remaining error(s) on pointing knowledge is one of the most important deficiencies, it is recommended to analyse the proposed request for implementation.

SSAG: H. Bovensmann, IUP	Date: 18.2.2007	Signature: e-mail 18.2.2007

Classification of OCR:

OCR Analysis (incl. Implementation Option):

For the implementation of this OCR special states and special timelines have to be defined.

States:

It is proposed to overwrite the settings of state ID 55 (Moon_pointing_troposphere). The following parameter tables have to be modified to implement the changes required for the 4 special states, which will be executed in subsequent orbits:

OCR Analysis (continued):

- Scanner state parameter
- State duration
- State RTCS index
- State index
- Exposure parameter

While State duration, State RTCS index, State index and Exposure parameter are identical for all 4 special states the sequence of the correction algorithms to be applied to ASM and ESM is different. Therefore several CTI parameter table uploads are required.

Timelines:
Only one special timeline is defined (set 09, ID 14). It contains only one state, i.e. the modified state ID 55. Running t/l 14 with different CTI parameter settings results in the execution of the required special states. The duration of t/l 14 amounts to about 47 sec. The timeline starts at a solar altitude of 150 km. Thus it can be executed immediately after timeline 2 (set 34, short SO&C timeline) and no scientific measurements are affected.

T/L 14 shall be executed for a total of 16 orbits with 4× for each special state.

SOST: M.Gottwald ; E.Krieg (ESA, Industry if necessary)	Date: 28.02.2007	Signature: email 28.02.2007
Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, DLR-IMF	Date: 28/02/2007	Signature: via e-mail 28/02/2007
SSAG Approval: H. Bovensmann	Date: 18.2.2007	Signature: e-mail. 18.2.2007

Decision / Approval:

OCR shall be implemented as proposed by M.Gottwald & E. Krieg.

DLR Approval: Ch. Chlebek	Date: 12.3.2007	Signature: e-mail, 12.3.2007

Implementation by SOST:

Starting 17th April the execution of special state ID55 will be performed as follows:

1. Orbits 26812 incl. 26815 ESM behaviour with ASM-acquisition first
2. Orbits 26816 incl. 26819 ESM behaviour with ESM-acquisition first
3. Orbits 26826 incl. 26829 ASM behaviour with ASM-acquisition first
4. Orbits 26830 incl. 26833 ASM behaviour with ESM-acquisition first

The final parameter settings are tested by means of the design tools and attached to this version of OCR_29

SOST: M.Gottwald; E.Krieg	Date: 12.3.2007	Signature: e-mail, 12.3.2007

Annex 1: Scan Phases

It is proposed to execute as the first and main task 4 different states using the Sun as target above the atmosphere with a duration of 40 sec each. The decision about using the moon as well is not yet done, since the IFE is still assessing/analysing the feasibility of the special states proposed by SOST-DLR.

A. ESM-behaviour

a) ASM-acquisition first

1. ESM + ASM prediction 4 sec
2. ASM acquisition 4 sec
3. ESM acquisition 2 sec
4. ESM improved prediction 20 sec nominal SO&C-scan
5. ESM acquisition 2 sec
6. ESM pointing 8 sec

b) ESM-acquisition first

1. ESM + ASM prediction 4 sec
2. ESM acquisition 4 sec
3. ASM acquisition 2 sec
4. ESM improved prediction 20 sec nominal SO&C-scan
5. ESM acquisition 2 sec
6. ESM pointing 8 sec

B. ASM-behaviour

a) ASM-acquisition first

1. ESM + ASM prediction 4 sec
2. ASM acquisition 4 sec
3. ESM acquisition 2 sec
4. ASM improved prediction 20 sec nominal SO&C-scan, increased scan width
5. ASM acquisition 2 sec
6. ASM pointing 8 sec

b) ESM-acquisition first

1. ESM + ASM prediction 4 sec
2. ESM acquisition 4 sec
3. ASM acquisition 2 sec
4. ASM improved prediction 20 sec nominal SO&C-scan, increased scan width
5. ASM acquisition 2 sec
6. ASM pointing 8 sec

The short description of the 6 measurement phases is related to the scanner correction applied. Explanations to these corrections are given on the SOST web-page. Executing in the 1st measurement phase an alignment of the LoS to the Sun by using the angular data given in the START-TL-mcmd and in the 2nd measurement phase the acquisition of the Sun controlled by the SFS should provide the deviation between predicted direction and one SFS-axis. The 3rd phase should provide the deviation between predicted direction and the other SFS-axis. The 4th phase should deliver the centre of the Sun as seen by the detectors/PMDs i.e. it should provide the deviation between SFS centre and the LoS. The 5th phase should indicate possible deviations due to the changing angular rate within phase 4. Phase 6 must produce no discontinuity in the angular positions measured.

Annex 2: Parameter Settings

State RTCS index

	State ID	HEX	ALPHAN
Sun extra_misaligment ESM-ASMacq-1st	55	0259	STT_02

State index

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Sun extra_misaligment ESM-ASMacq-1st	55	1	32	31	29

PET

State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
55	Low	,0625	,0625	,0625	,0625	,0625	,0625	,0625	,0313	,0313	,0625	55	High	,0625	,0625	,0625	,0625	,0625	,0625	,0625	,0313	,0313	,0625

State duration

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
Sun extra_misaligment ESM-ASMacq-1st	55	255	STANDARD	640	10217	11515	8

Scanner state

ESM: ASM-acquisition first; ESM scan

Scanner State Parameter #55	55	Sun extra_misaligment ESM-ASMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	002								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	4	4	4	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	8	4	9	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ESM: ESM-acquisition first; ESM scan

	55	Sun extra_misaligment ESM-ESMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	002								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	8	4	4	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	4	4	9	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ASM: ASM-acquisition first; ASM scan

	55	Sun extra_misaligment ASM-ASMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	004								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	4	4	9	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	8	4	4	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ASM: ESM-acquisition first; ASM scan

	55	Sun extra_misaligment ASM-ESMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	004								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	8	4	9	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	4	4	4	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

OCR_30: Test of Limb Mesosphere-Thermosphere State

SCIAMACHY	**Operation Change Request**	OCR No: 30 Issue: A

Title: Test of Limb Mesosphere-Thermosphere State

Description of Request:

A number of trace gas emissions can be identified in the upper mesosphere in the SCIAMACHY limb measurements, including NO from the gamma-bands, OH at ~ 308 nm, O_2, Mg, Mg^+, atomic oxygen, O^+, Fe, Fe^+, and Na. A retrieval algorithm for mesospheric emission species has been developed at the Institute of Environmental Physics, University of Bremen, and has been applied successfully to NO, Mg, Mg^+ and ozone from the excited-state O_2 bands. However, a number of these species have significant contributions in the lower thermosphere, between 90 - 150 km, above the highest SCIAMACHY limb altitude; this is especially true for O, NO and the metals and metal ions. The thermospheric content of NO, Mg and Mg^+ at the moment is derived from limb-nadir matching. However, if the complete upper mesosphere / lower thermosphere region could be covered by limb scans, two goals could be achieved: the derivation of the mesospheric content of these species could be improved significantly, and also the thermospheric profiles would be available. Thus, it would be possible for example to study the downwelling of atomic oxygen and NO from the thermosphere into the mesosphere, and also to study the ablation of metals from meteors in the lower thermosphere, and the subsequent downward propagation of meteoric material into the middle atmosphere.

Therefore, we request the following test: To change the setting of the limb sequence for one to two days to test whether a mesosphere-thermosphere state yields the expected improvement to the mesospheric retrievals and thermospheric content. This new 'mesosphere-thermosphere' state should consist of the same number of tangent height steps as the current state, with the same vertical spacing, but shifted in altitude by 60 km in such a way that the limb-scans cover an altitude range of ~60-150 km. Thus, the density peaks of NO as well as of most of the metals would be covered by this state. The best time of year for such a test would be at the end of polar winter, either in July / August or in February / March, to cover downwelling of thermospheric air into the mesosphere.

Originator: M. Sinnhuber, C. von Savigny, IFE	Date of Issue: 2007-3-26	Signature: MS 2007-3-26

Assessment of SSAG (necessary for requests by scientists):

The proposed measurements will allow unique investigations on the composition of the upper mesosphere and lower thermosphere as explained above. Nevertheless, the proposed modification of the limb state will result in lower coverage of the troposphere and the stratosphere. This is acceptable so far for a few and non-permanent test cases as requested above to generate data to investigate and demonstrate the added value of scanning the upper mesosphere and lower thermosphere. Therefore the request for a few test cases is supported by SSAG, assuming that the impact on nominal limb will be as small as possible.

SSAG: H. Bovensmann, IUP	Date: 13.4.2007	Signature: e-mail, 13.4.2007

Classification of OCR: Category D

OCR Analysis (incl. Implementation Option):

This OCR can be implemented via state parameter table modifications only. Thus it is independent of the planning cycle.

- modify the PET-table for all limb states (28 to 33) to a PET of 1.5 sec in channel 1.
- modify Basic Profile ID 2 (limb scanning pointing) from -237101×10-6 rad (=-13.58 deg, equivalent to a LoS elevation of -27.17 deg, i.e. 3 km below the horizon) to -227504×10-6 rad (= -13.035 deg, equivalent to a LoS elevation of 26.07 deg, i.e. an altitude of 60 km within the orbit range).

Note: During execution of the OCR on July 30th the instrument was transferred to HTR/RF. This was due to an – by then – unknown on-board check of integration times and measurement duration. It was noticed that the co-adding settings for states 30-32 was unsuitable for the selected modified PETs. Therefore the co-adding tables for states 30-32 (tables 3-5) had to be modified as well. The co-adding factors for the channel 1b clusters were all set to 1.

When executing the nominal timelines for the duration of OCR_30 implementation (1.5 days) all limb measurements start at an altitude of 60 km. This should be reported to data processing and the user community.

The modified parameter will be loaded for a period of 1.5 days between orbit 28304 and 28325 (July 30th/31st).

Note 1: If quick analysis of the mesosphere/thermosphere measurements suggest that executing OCR_30 is recommended at a somehow different seasonal phase, we can repeat OCR_30 by temporarily modifying state parameter tables again. The timeline/planning cycle independent approach is rather flexible in that respect.

Note 2: A further approach would be to modify e.g. state ID 55 to become the special limb state and just run this state during the 1.5 day period instead of the nominal limb states. This option is less flexible since it would require generating new timelines such that OCR implementation becomes planning cycle dependent. As a result it could not be ensured to run OCR_30 and of July.

SOST: M.Gottwald, E.Krieg (ESA, Industry if necessary)	Date: 21/05/2007	Signature: via e-mail, 21/05/2007

Approval of Proposed Implementation:

Originator Approval: C. von Savigny, IFE	Date: 22/05/2007	Signature: via e-mail, 22/05/2007
SSAG Approval: H. Bovensmann, IUP	Date: 05/06/2007	Signature: via e-mail, 05/06/2007

Decision / Approval:

The OCR shall be implemented as proposed by SOST.

DLR Approval: Ch. Chlebek	Date: 25.7.2007	Signature: e-mail 25.7.2007

Implementation by SOST: 4 CTI-files have been created for the implementation of OCR_30 in the timeslot proposed (validity start July 30th, 09:37:00 UTC). Basic profile 2 is modified for 60km altitude and PET for channel 1b of state ID 30 - 32 has been prolonged to 1.5 sec. Starting in orbit 28326 (July 31st) the modifications are reversed by 4 more MCMDs to nominal final flight configuration. All 8 CTI-files have been transferred to FOCC for execution. **Note: Because of the anomaly described above 14 CTI tables had to be generated anew for repeating the measurements on August 8/9th (orbit 28433-28454).**		
SOST: E.Krieg	Date: 22/06/2007	Signature: via e-mail, 22/06/2007

OCR_31: Characterisation of the Spatial Straylight in Limb Measurement Mode

SCIAMACHY	**Operation Change Request**	OCR No: 31 Issue: A

Title: Characterisation of the Spatial Straylight in Limb Measurement Mode

Description of Request:

The spatial straylight in Limb has a measurable influence on Limb measurements, and an unknown but probably significant impact on trace-gas or pointing retrievals. Attempts to characterise the straylight using available SODAP measurements yielded insufficient quantitative information. The SODAP measurements indicate that the spatial straylight is due to scattering off the ASM mirror, but a contribution from baffle scattering can not be excluded. Therefore it is requested to perform a limited number of special state measurements for spatial straylight characterisation. The special states are slightly modified Limb scanning or pointing states, which are executed with the Sun in the TCFOV to characterise mirror straylight, and with the Sun outside the TCFOV to check for baffle straylight. Each state needs to be executed only once. In particular, the following measurements are proposed:

1) One Limb scanning state which has the Sun inside the TCFOV at the start of the measurement, the Sun outside the TCFOV at the end of the measurement. At the beginning of the state, the tangent height shall be above the atmosphere. The “Limb dark” pointing shall be outside the TCFOV. The preferred integration time of channels 2-6 is 0.375 seconds.

2) Several Limb pointing states, which differ only in ASM azimuth pointing. The most important measurement shall have the same azimuth as the Sun (within the length of the slit), and the Sun shall be measured at different elevation distances from the IFOV. At the beginning of the state, the IFOV shall be located just under the Sun, the tangent height shall be above the atmosphere, and the tangent height step shall be less than the solar elevation rate. Other azimuths are, in order of importance, 8 degree East of flight direction, 8 degree West of flight direction, 10 degree West of Sun, exactly in flight direction. The preferred integration time of all channels is 1.5 seconds.

Originator: S. Slijkhuis, DLR-IMF	Date of Issue: 25-Jan-2007	Signature: e-mail Sander.Slijkhuis 25.01.2007

Assessment of SSAG (necessary for requests by scientists):

As stated above there are several indications that external straylight in limb measurement mode is affecting the data quality significantly. The characterisation of the straylight in flight is therefore recommended.

SSAG: H. Bovensmann	Date: 17.4.2007	Signature: e-mail, 17.4.2007

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

This OCR requires to define 7 states and 2 timelines. We suggest that safety issues are considered because we point the IFoV close to the Sun. Although the statement exists that the detectors can cope with direct Sun illumination with **APSM large** and **NDFM out** (RTCS 1), we recommend to follow a very safe approach. This includes potential impacts onto the thermal state of detectors 7 & 8 with direct Sun illumination in the above configuration. Therefore we propose here to implement the initial straylight test states with **APSM small** and **NDFM in** (RTCS 2). If only RTCS 1 can ensure successful measurements, it has to be verified that this configuration does not harm the detectors. This will be done by executing the measurement close to the Sun of 2) with **APSM small** and **NDFM in** first. After analysis of the acquired data a decision has to be made whether the remaining measurements of 2) and 1) can be safely executed with **APSM large** and **NDFM out** . The analysis of the first part is presented in annexed at the end of this OCR.

States: In total 7 different states have to be implemented to fulfil the requirements of OCR31. For the measurements of 1) two states require the nominal limb scan strategy. These states are labelled 1_1 and 1_2., The measurements of 2) need 5 states in limb pointing geometry (labelled states 2_1 to 2_5). All 7 states have to be executed during the SO&C-window and above the atmosphere. Note that all states are executed with nominal platform and instrument yaw steering, i.e. the -Y axis is always slightly off flight direction. Furthermore all states will be built with the isimilar state duration, number of scan phases and scans (30).
The implementation proposed below implies the identical general design for the states 1_1 and 2_1 to 2_5:

- Start of the state when the Sun has reached an altitude of 150 km. Since all states shall start with the same position for the ESM, the ESM begins scanning/pointing at a lower altitude (state 2-1 requires to point close to the lower edge of the solar disk).
- Execute limb scans resp. limb pointing until the Sun has proceeded 1 deg above the upper edge of the TCFoV. The time until the Sun leaves the upper edge of the TCFoV is for August approx. 92 sec. The additional 1 deg rise takes about 20 sec. In total 60 scans are needed.
- Execution of limb scan profile (ASM – relative profile 3, factor 4 or 0; ESM – relative profile 1, factor 3! to produce larger angular distances between sun and slit) with vertical steps of 1.5 km each.
- At end of the limb scans execute a jump to an elevation position above the upper edge of the limb TCFoV, i.e. looking into the baffle and continue measurements in pointing mode at a constant altitude for 3 sec.
- Execution shall take place, when no moon observations or monthly calibration activities are planned so that basic profiles from calibration states may be overwritten to produce the 2 different ESM positions and the 1 ASM position.

State 1_2 differs slightly as after 30 limb scans the ESM jumps to a fixed position in the baffle where the ASM then continues with the remaining 30 scans. While states 1_1 and 2_1 to 2_5 allow to determine the straylight in the TCFoV when the Sun is in and out of the TCFoV, state 1_2 helps to quantify the baffle straylight.

Based on the results from OCR_29 (special state ID55 in orbit range 26812 to 26833, e-mail S. Slijkhuis, dated 14/5/2007) for state 2_1 (to be executed first) a T_{int} = PET of 0.5 sec is required. The settings for the other 6 states will be defined after evaluation of state 2_1. More detailed description of special state design is given in the annex including the modified parameter tables. For implementation the state ID55 (moon_troposphere) will be overwritten and altered sequentially as required.

OCR Analysis (continued):

Timelines: Because the state duration differs slightly between states 2_1 and 1_1, 1_2 and 2_2-2_5 two timelines are needed to implement OCR_31. They will be defined in t/l set 09. These test timeline include only the one test state, which shall be performed with data rate set to HIGH since it is executed within the SO&C-window.

After completion of each test timeline the nominal timelines 47 or 50 are scheduled. Note that due to the requirement to continue measurements in states 1_1 to 2_5 for another 20 sec after the Sun has reached the upper edge of the limb TCFoV, timelines 47 and 50 (note: they run front-to-back) are slightly delayed as compared to routine operations. However the shift is less than half a limb/nadir state duration such that the nominal t/l 47 and 50 can still be used. In all orbits where OCR_31 is scheduled the nominal t/l 02 front-to-back) are slightly delayed as compared to routine operations. However the shift is less than half a limb/nadir state duration such that the nominal t/l 47 and 50 can still be used. In all orbits where OCR_31 is scheduled the nominal t/l 02 (SO&C-state ID47) will be executed beforehand.

Each test state shall be performed twice, i.e. OCR_31 requires 14 orbits. Depending on the approval of the implementation approach the measurements can be planned in the August timeframe.

SOST: M. Gottwald, E.Krieg; DLR-IMF	Date: 21.5.2007	Signature: via e-mail, 21.5.2007

Approval of Proposed Implementation:

Originator Approval: S. Slijkhuis, DLR-IMF	Date: 21.6.2007	Signature: e-mail 21.6.2007
SSAG Approval: H. Bovensmann	Date: 05.6.2007	Signature: Via e-mail, 5.6.2007

Decision / Approval:

The OCR shall be implemented as proposed by SOST considering the integration times proposed by Sander Slijkhuis:
- 0.375 sec for scanning and 0.5 sec for pointing
- settings for the other 6 states will be defined after evaluation of state 2_1

DLR Approval: Ch. Chlebek	Date: 25.6.07	Signature: e-mail, 25.06.2007

Implementation by SOST:

Implementation for the first test executing state 2_1 will take place 11th September in orbits 28917 incl. 28920 (4 orbits have been scheduled instead of 2 to ensure that NRT products are immediately available). Parameter setting are given in annex 2.

The remaining measurements are scheduled in orbits 30836-30849 (January 23rd/24th 2008). The sequence of states (2 orbits each) is 2_2, 2_3, 2_4, 2_5, 1_1 and 1_2. Between execution of 2_4 and 2_5 the 2 nominal daily calibration orbits are executed.
Parameter settings are given in annex 3.

Timelines will be 14_02 (state 2_1) and 14_03 (all other states) in timeline set 09.

Implementation by SOST (continued): Note: State 2_1 will be executed using correction 8 – sun/moon tracking using SC_AOCS – to provide optimum alignment of ASM to sun disk. All other states, which will be performed with different ASM offsets, will be executed using correction 2 – correct with earth model without instrument yaw-steering – implementing Sun ASM-position, Sun ASM-rate and offset via basic profile.		
SOST: M. Gottwald, DLR-IMF E. Krieg, DLR-IMF	Date: 03.08.2007 / 07.12.2007	Signature: e-mail, 03.08.2007 / 07.12.2007

Annex 1: Detailed State Design

State 1_1:
This modified limb state shall be executed in the nominal limb observation direction, while the Sun is within the limb TCFoV i.e. the Sun has a azimuthal LoS distance to the slit of approx. 27deg. The starting height for the ESM will be defined by basic profile 5, ASM position will be flight direction. The ASM scan motion will be as in a nominal limb state. The ESM steps will be reduced by a factor of 2 to increase the vertical distance between Sun centre and the IFoV to about 190 km at the end of the limb scan sequence. At the end of the 60 horizontal scans a step upwards of the ESM to a position 2 deg outside the TCFoV takes place – ESM basic profile 13. This position will be maintained for a total duration of 2*1.6875 sec to produce dark signals in pointing mode (no horizontal scans). PET and Coadding table will be finally chosen after execution and analysis of state 2_1. If possible the integration times for channels 2-6 shall be equivalent to 0.375 sec.

State 1_2:
This state shall be executed similar to state 1_1 in the nominal limb observation direction, while the Sun is within the limb TCFoV. The starting altitude for the ESM is identical to state 1_1 as well as all other scanner settings. At the end of 30 horizontal scans a step upwards of the ESM to the position 2 deg outside the TCFoV takes place. This position will be maintained for the remaining 30 scans (duration = 30*1.6875 sec, pointing mode) to produce signals at decreasing Sun distances to the upper edge of the limb baffle. PET and Coadding table will be chosen as for state 1_1.

States 2_1 to 2_5 shall be executed without a horizontal scan, i.e. ASM relative profile 3 factor will be set to = 0. Except for the state 2_1 the PET and Coadding tables will be specified after evaluation of state 2_1. For state 2_1 the channel 2-6 integration times are set to 0.5 sec.

State 2_1:
The ASM direction shall be aligned with the Sun, the ESM shall be positioned 0.3 deg below the Sun. For a solar centre altitude of 150 km this is equivalent to an IFoV start altitude of 122 km (note that this start IFoV altitude is used in all state definitions of OCR_31 while the timeline definition has to use the solar altitude of 150 km). This requires basic profile 10 (ESM) to be set according to the Sun position at execution time. ASM position during state execution will be controlled by the MPS using the predicted sun position and rate in the START-TL-mcmd by defining correction 8 – Sun pointing using SC-AOCS. [For back-up reasons ASM position and rate in basic profile 13 will be set to sun azimuth and to coarsely compensate the azimuth rate of the Sun]. The vertical step sequence will be as in state 1_1, i.e. the jump to the specified position outside the TCFoV is included.

State 2_2:
The ASM direction shall be aligned with flight direction plus an offset of 8 deg LoS left. As in state 2_1 this requires basic profile 13 ASM to be set in flight direction (-45 deg) plus the additional ASM offset . The ASM rate in basic profile 13 will be set to coarsely compensate the azimuth rate of the Sun. ESM positions will be as in state 2_1.

State 2_3:
This state is like state 2_2 but the offset will be 8 deg right.

State 2_4:
The ASM shall be aligned with the Sun plus an offset of 10 deg LoS right of the Sun. This requires basic profile 13 (ASM) to be set according to the Sun position at execution time, ESM as in state 2_1.

State 2_5:
The ASM direction shall be aligned exactly with flight direction. This state resembles a nominal limb pointing state with ESM steps reduced to 1.5 km but executed with the Sun positioned within the limb TCFoV. The nominal limb basic profile 2 will be used.

State 1_1 and 2_1 to 2_5:

Time		Event	Sun		IFOV	
			altitude (km)	elevation (deg)	altitude (km)	elevation (deg)
T0	0 sec	Start of measurement	150	24.37	122	25.15
T1	T0 + 89.5 sec	Sun reaches end of TCFoV	378	19.50	202	23.36
T2	T0+101.25 sec	End 60 limb scans in TCFoV	401	18.94	212	23.15
T3	T0 + 101.25 sec	Start measurement in baffle (limb pointing at constant elevation)	401	18.94	458	17.50
T4	T0 + 104.5 sec	End measurement in baffle (limb pointing at constant elevation)	409	18.76	458	17.50
T5	T0 + 109.5 sec	Sun 1 deg above upper baffle	420	18.50	458	17.50

State 1_2:

Time		Event	Sun		IFOV	
			altitude (km)	elevation (deg)	altitude (km)	elevation (deg)
T0	0 sec	Start of measurement	150	24.37	122	25.15
T1	T0 + 50.5 sec	End 30 limb scans in TCFoV	283	21.67	167	24.05
T2	T0 + 50.5 sec	Start measurement in baffle (limb pointing at constant elevation)	283	21.67	458	17.50
T3	T0 + 89.5 sec	Sun reaches end of TCFoV	378	19.50	458	17.50
T4	T0 + 101.25 sec	End measurement in baffle (limb pointing at constant elevation)	401	18.76	458	17.50
T5	T0 + 109.5 sec	Sun 1 deg above upper baffle	420	18.50	458	17.50

Table 1: Illustration of Sun and IFoV LoS altitude and elevation for the different phases of the straylight states. Due to the seasonal variations all figures are accurate to within a few seconds only.

Details of the parameter settings follow on the next pages.

Annex 2: Parameter Tables Required for State 2_1

State RTCS index table:

	State ID	HEX	ALPHAN
Limb_straylight	55	0259	STT_02

State duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait			
Limb_straylight	55	27	Limb	1674	26760	28058	8	OCR31 - WSR for STT02		

Note 1:
WSR is set to value = 8 cts since this is the minimum time taken by the ICU to send a primitive cmd to the PMTC. The usual time needed for WSR for a limb-type measurement would be 174 cts, but since in this modified limb state ID55 the APSM and the NDFM are sequentially commanded to their home position each taking 132 cts, the return of the scanners to the Idle position taking 174cts can occur within these 2*132 cts and no longer ΔT than the 8 cts has to be accounted for WSR in the RTCS respectively the state duration table.

Note 2:
Just for reasons of margin in a discussion with EADS-ASTRIUM R. Mager proposed to make here a very safe approach and allow an additional gap of this 174 cts. This can be realised by adding at least 174 cts to the timeline duration e.g. at parameter TL-pad. In this case the state RTCS is executed as defined by STT_02 and the values specified in the state duration table for this state. The next timeline and its first state are started after an additional IDLE gap of the specified TL-pad.

State Index:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Limb-straylight	55	1	10	5	31

Note:
Limb-straylight will be executed with data rate HIGH only since the execution will take place in the SO&C window with high data rate available. Insofar any conflicts in state parameter settings for data rate low can be neglected.

PET Table:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Limb straylight	55	Low	,5	,5	,5	,5	,5	,5	,5	,5	,5	,5	55	High	,5	,5	,5	,5	,5	,5	,5	,5	,5	,5	changed due to =OCR_31

<u>Note:</u>
High rate only is applicable. Coadding in all clusters is set to 1. T_INT will be 0.5 sec.

Scanner state parameter table:

Scanner State Parameter #55 55 Limb Straylight 2-n

	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	003								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		1300,0	101250,0	250,0	3125,0	840,0	0,0	0,0	0,0
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	1	1	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	1	1	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	8	8	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		13	13	13	13	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	1	1	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		2	2	2	2	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		10	10	13	13	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0

Here the times for limb-states are used in phase 3 and 4, whereby phase 4 is extended by 1.6875 sec. Phase 5 uses the nominal time for a Limb state.

Scanner basic profile table:

Since the standard moon basic ESM profile 5 is used for state 27 (Limb-Mesosphere) and the special states will be schedules outside any calibration activities it is proposed to overwrite temporarily some calibration specific basic profiles:

- *ESM basic profiles:*
  10 (SLS) -> to achieve approx. 120 km altitude
  13 (WLS) -> to achieve approx. 460 km altitude
- *ASM basic profile:*
  13 (Sun Diffuser 5) -> to produce the mean Sun azimuth and rate and including any offset to be accounted for (unused because of correction 8).

Scanner Basic Profile EU

Basic Scan Profile ID	Basic Scan Rate Azimuth [10-6 rad/sec]	Basic Scan Rate Elevation [10-6 rad/sec]	Basic Scan Position Azimuth [10-6 rad]	Basic Scan Position Elevation [10-6 rad]		
						Orbit 28917
10	-008145	000000	0003263766	-217904	OCR_31	ESM position 120km (sun = 150km)
13	-000093	000000	-0000536252	-152716	OCR_31	ESM position 1.6 deg (CFI) above limb TCFoV; sun-az = 331,45deg (CFI)

State 2-1 (ID 55) timing inputs for timeline generation:

RTCS	STT_02
RTCS set-up	900 cts
RTCS cleanup	374 (1290-900-24+8)
total RTCS-duration	1290 cts
WME	26760 cts (62*27*16 - 24)
WSR	8 cts
SDPU duration	1674 cts
state duration	28058 cts (1290+26760+8)

set-up	900 cts
cleanup	374 cts
measurement	26784 cts (62*27*16)
total duration	28058 cts

phase 1	1300 msec
phase 2	101250 msec
phase 3	250 msec
phase 4	3125 msec
phase 5	840 msec

Annex 3: Parameter Tables Required for States 1_1, 1_2 and 2_2-2_5

In total 6 more states are executed. As described on page 4 they are of 2 different types

- type 1 is performing nominal limb azimuth scans and elevation steps, while the sun is within the FoV
- type 2 is performing elevation steps and pointing in azimuth to fixed positions

All 6 states are planned for sequential execution always for 2 orbits starting the 23rd of January 2008. The table below summarises the sequence, the key settings and the CTI-tables required:

State	Orbit range	ASM scan & viewing direction	ESM scan & viewing direction	CTI-type required
2-2	30836-37	point in flight dir + 8° left	60 steps, start at –25,04°	Scanner Basic Profile, Scanner State, State Index, State Duration, Pixel
2-3	30838-39	point in flight dir + 8° right	60 steps, start at –25,04°	Scanner Basic Profile
2-4	30840-41	point in sun dir at 150km + 10° right	60 steps, start at –25,04°	Scanner Basic Profile
2-5	30844-45	point in flight dir	60 steps, start at –25,04°	Scanner Basic Profile
1-1	30846-47	nominal Limb scan in flight dir (60)	60 steps, start at –25,04°	Scanner State
1-2	30848-49	nominal Limb scan in flight dir (30)	30 steps, start at –25,04°	Scanner State

The actual values to be implemented are shown in the following tables, whereby.The first 3 parameter tables are those applicable for all 6 special states and the next ones are marked for the individual states.

State duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait	
Limb_straylight	55	27	Limb	1674	26760	27696	174	OCR31 - WSR for STT01

Note:
WSR is set to value = 174 cts since these states are executed with APSM_large and NDFM_Out based on the results gained during execution of state type 2-1. Due to this fact the nominally applicable RTCS STT01 to state ID55 can be used for these special states the setting of the state_RTCS-table can remain.

State Index:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Limb-straylight	55	1	10	5	31

Note:
Limb-straylight will be executed with data rate HIGH only since the execution will take place in the SO&C window with high data rate available. Insofar any conflicts in state parameter settings for data rate low can be neglected.

PET Table:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Limb straylight	55	Low	,5	,5	,5	,5	,5	,5	,5	,5	,5	,5	55	High	,5	,5	,5	,5	,5	,5	,5	,5	,5	,5	changed due to =OCR_31

Note:
High rate only is applicable. Co-adding in all clusters is set to 1. T_INT will be 0.5 sec.

Scanner state parameter table applicable for state 2-2 to 2-5:

Scanner State Parameter #55 55 Limb Straylight 2-n

	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	003								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		1300,0	101250,0	250,0	3125,0	840,0	0,0	0,0	0,0
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		13	13	13	13	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		10	10	13	13	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0

ASM is pointing in directions as described on p.8, ESM is stepping upwards.

Scanner basic profile table:

- *ESM basic profiles:*
  10 (SLS) -> to achieve approx. 120 km altitude
  13 (WLS) -> to achieve approx. 460 km altitude
- *ASM basic profile:*
  13 (Sun Diffuser 5) -> to produce the LoS direction as described on p.8, no compen-sation of the solar rate is implemented.

State 2_2:

Scanner Basic Profile EU

Basic Scan Profile ID	Basic Scan Rate Azimuth [10-6 rad/sec]	Basic Scan Rate Elevation [10-6 rad/sec]	Basic Scan Position Azimuth [10-6 rad]	Basic Scan Position Elevation [10-6 rad]		
10	-008145	000000	0003263766	-218515	OCR_31	ESM position 120km (sun = 150km)
13	000000	000000	-0000715585	-152716	OCR_31	ESM position 1.6 deg (CFI) above limb TCFoV; LoS_Az = - 82deg

State 2_3:

Scanner Basic Profile EU

Basic Scan Profile ID	Basic Scan Rate Azimuth [10-6 rad/sec]	Basic Scan Rate Elevation [10-6 rad/sec]	Basic Scan Position Azimuth [10-6 rad]	Basic Scan Position Elevation [10-6 rad]		
10	-008145	000000	0003263766	-218515	OCR_31	ESM position 120km (sun = 150km)
13	000000	000000	-0000855211	-152716	OCR_31	ESM position 1.6 deg (CFI) above limb TCFoV; LoS_az = - 98deg

State 2_4:

Scanner Basic Profile EU

orbit 30840

Basic Scan Profile ID	Basic Scan Rate Azimuth [10-6 rad/sec]	Basic Scan Rate Elevation [10-6 rad/sec]	Basic Scan Position Azimuth [10-6 rad]	Basic Scan Position Elevation [10-6 rad]		
10	-008145	000000	0003263766	-218515	OCR_31	ESM position 120km (sun = 150km)
13	000000	000000	-0000558348	-152716	OCR_31	ESM position 1.6 deg (CFI) above limb TCFoV; sun-az - 10deg

State 2_5; 1_1; 1_2:

Scanner Basic Profile EU

Basic Scan Profile ID	Basic Scan Rate Azimuth [10-6 rad/sec]	Basic Scan Rate Elevation [10-6 rad/sec]	Basic Scan Position Azimuth [10-6 rad]	Basic Scan Position Elevation [10-6 rad]		
10	-008145	000000	0003263766	-218690	OCR_31	ESM position 120km (sun = 150km)
13	000000	000000	-0000785398	-152716	OCR_31	ESM position 1.6 deg (CFI) above limb TCFoV; LoS_az - 90deg

The basic profile remains for the execution of all 3 states in orbits 30844 incl. 30849

The special states in orbits 30846-30849 are executing actual limb-scans with the ASM and require therefore new settings for the scanning parameters.

Scanner state parameter table:

State 1_1:

This state performs in total 60 limb-scans before stepping up to the usual position outside the TCFoV.

Scanner State Parameter #55	55	Limb Straylight 1-1							
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	003								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	004								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		1300	101250	250	3125	840	0	0	0
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		13	13	13	13	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		10	10	13	13	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	59	0	0	0	0	0	0

State 1_2:

This state performs in total 30 limb-scans before stepping up to the usual position outside the TCFoV and waiting for the rest of the state duration while the Sun is approaching.

Scanner State Parameter #55	55	Limb Straylight 1-2							
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	003								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	004								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		1300	50625	250	53750	840	0,0	0,0	0,0
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	5	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		13	13	13	13	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	29	0	25	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	5	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		10	10	13	13	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	29	0	25	0	0	0	0

State 2-2 to 2-5 and 1-1 (ID 55) timing inputs for timeline generation:

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	374 (1290-900-24+8)
total RTCS-duration	762 cts
WME	26760 cts (62*27*16 - 2) –(6+8+8)
WSR	174 cts
SDPU duration	1674 cts
state duration	27696 cts (762+26760+174)

set-up	636 cts
cleanup	276 cts
measurement	26784 cts (62*27*16)
total duration	27696 cts

phase 1	1300 msec
phase 2	101250 msec resp.
phase 3	250 msec
phase 4	3125 msec
phase 5	840 msec

State 1-2 (ID 55) timing inputs for timeline generation:

Note: Only the duration of phase 2 and 4 has changed – all other values stay unchanged. No modification of the existing TL is required

phase 1	1300 msec
phase 2	50625 msec resp.
phase 3	250 msec
phase 4	53750 msec
phase 5	840 msec

OCR_32: Change Integration Time for Cluster 16 an 18 (Channel 3) for 4-24 Nov 2007 to 0.25 or Shorter

<table>
<tr><td rowspan="2">SCIAMACHY</td><td rowspan="2" colspan="2">Operation Change Request</td><td>OCR No: 32</td></tr>
<tr><td>Issue: A</td></tr>
<tr><td colspan="4">Title: Change Integration Time for Cluster 16 an 18 (Channel 3) for 4-24 Nov 2007 to 0.25 or Shorter</td></tr>
<tr><td colspan="4"><u>Description of Request:</u>

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) because tests found out that with the entire data set from ~530 to 595 nm we can resolve Synechococcus (a dominating phytoplankton species in tropical areas) absorption within this wavelength range. So far the integration time in clusters 16 and 18 is around 1 not enough to get meaningful results for further phytoplankton modelling approaches. With resolving Synechococcus distributions from SCIAMACHY data, this enables to distinguish this species from other cyanobacteria species and helps to improve phytoplankton biomass estimates and marine nutrient flux studies. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups. We choose the time of Nov 4-24 2007, because then we are measuring online in the Atlantic Ocean between 20°N and 25°S in situ phytoplankton characteristics during a ship cruise (on Research Vessel Polarstern, Ant XXIV-1). It is sufficient to fullfil the above requirements for solar zenith angles smaller 60°.</td></tr>
<tr><td>Originator: Astrid Bracher, IFE</td><td colspan="2">Date of Issue: 2007-06-27</td><td>Signature: A. Bracher by email 2007-06-27</td></tr>
<tr><td colspan="4"><u>Assessment of SSAG (necessary for requests by scientists):</u>

The proposed change, as long as not conflicting with the nominal measurement sequence and not affecting the quality of the data products, is an unique (there is no other sensor in space to do it) opportunity to test phytoplankton retrieval using high spectrally resolved reflectance data. Therefore it is recommended to investigate the implementation of the proposed temporary change.</td></tr>
<tr><td>SSAG: H. Bovensmann</td><td colspan="2">Date: 29.6.2007</td><td>Signature: e-mail 29.6.2007</td></tr>
<tr><td colspan="4">Classification of OCR: D</td></tr>
<tr><td colspan="4"><u>OCR Analysis (incl. Implementation Option):</u>

A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15,16,17 and 18.

The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.</td></tr>
</table>

<table>
<tr><td colspan="3"><u>OCR Analysis (continued):</u>

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters.
(Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30km x 60 km, 1 s to about 30km x 240 km.)

The following options are proposed (see Annex for details; note that for all options co-addings for clusters 16 & 18 are set to 4 as described above):

<u>Option 1:</u>
Increase integration time in cluster 32 (channel 5, PMD 4/7, AE) to 0.5 s and in overlap channel 6/7 to 1s.
<u>Option 2:</u>
Increase integration times of “non-special” clusters in channel 7 (48,49,51,53) and blinded pixels in channel 6 (36,47) to 5s.

We consider option 1 to be our baseline, since it has none of the – although uncritical – settings of option 2 (see annex). If not requested otherwise this option will be implemented.</td></tr>
<tr><td>SOST: S. Noël, IFE; E. Krieg, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 13/07/07</td><td>Signature: via e-mail, 13/07/07</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
A. Bracher</td><td>Date:19.7.2007</td><td>Signature: e-mail 19.7.2007</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date: 2.10.2007</td><td>Signature: e-mail 2.10.2007</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>

In the light of the discussion on option 1 and 2 end of July 2007 (see e-mail A. von Bargen – H. Bovensmann 26.7.2007) and as the used co-adding factors are within the specified range it is recommended to implement option 2.

Data users needs to be informed in advance on this temporary change of integration times (Action ESA).</td></tr>
<tr><td>DLR Approval:
Ch. Chlebek</td><td>Date:
18.10.2007</td><td>Signature: e-mail 18.10.2007</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

Decision has been taken to implement option 2. Co-adding tables 26 and 27 will be modified according to the definitions for option 2 (see corresponding N6 and N7 in the annex).

Start orbit for the execution OCR_32 is 29687 (November 4th at about 00:35 UTC). Return to final flight settings occurs in orbit 29988 (November 25th at about 01:17 UTC).</td></tr>
<tr><td>SOST: M.Gottwald
E.Krieg</td><td>Date: 18.11.2007</td><td>Signature: e-mail 18.10.2007</td></tr>
</table>

Annex:

The following pages give a summary of the new state settings for all options. Changed integration times are marked yellow.

Notes:

- For option 2 the maximum data rate of 390000 bits/s is slightly exceeded. This is considered to be uncritical since nadir states with data rates up to 391034 bits/s have already been run successfully.
- Option 2 requires co-adding factors of 10 and 40 which have up to now not been used. This is also considered to be uncritical as co-addings up to 64 are allowed and co-adding factors which are not powers of 2 (like 5 and 20) are already in use.

Option 1:

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,25	0,5
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	4	0,25	1
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							383594

Summary of results N7

State						N7	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	4	0,125	0,5
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							380013

Option 2:

Summary of results N6

State						N6	
Cluster Ind.	**Description**	**min/max wavelength , nm**		**Channel**	**Coadding**	**PET (s)**	**Int. Time(s)**
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	2	0,25	0,5
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	4	0,125	0,5
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							**386333**

Summary of results N7

State						N7	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,125	0,25
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	40	0,125	5
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	40	0,125	5
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	10	0,5	5
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	10	0,5	5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390784

OCR_33: Improved Limb Coverage During ECOMA-4 NLC Campaign

SCIAMACHY	Operation Change Request	OCR No: 33 Issue:

Title: Improved Limb Coverage During ECOMA-4 NLC Campaign

Description of Request:

During the period June 30 – July 13, 2008 the international rocket campaign ECOMA-4 (**E**xistence and **C**harge state **O**f meteoric smoke particles in the **M**iddle **A**tmosphere) will be conducted from Andoya rocket range in Norway (69 N, 16 E). One of the foci of this campaign is the investigation of Noctilucent clouds (NLCs), which were also studied extensively with SCIAMACHY limb measurements in recent years. The ECOMA-4 campaign will allow for unprecedented synergies between satellite, rocket and also LIDAR measurements.

In order to improve the spatial overlap of satellite and rocket measurements and maximize the common air volumes, we are asking to optimize the SCIAMACHY limb coverage so that for every day during the period June 30 – July 13, 2008 the distance between Andoya rocket range and the centre of the limb ground swath is a minimum. Furthermore, in order to improve the spatial resolution across viewing direction we request a change of the integration times for channel 1 (particularly the 265 to 300 nm wavelength range, i.e. clusters 3 and 4) to 0.1875 s such that 8 integrations per TH are performed. For channels 3 and 4 (clusters 15 and 20) we request 16 integrations per tangent height. This change in integration times is requested for all limb measurements above 60N latitude, if possible.

These measurements will likely lead to new insights to the physics of aerosols at the summer mesopause and allow for a direct validation of SCIAMACHY NLC particle size retrievals with coincident rocket and LIDAR measurements. This collaboration between the SCIAMACHY team and IAP (Institut für Atmosphärenphysik) at Kühlungsborn is carried out within the framework of the international SCOSTEP-"CAWSES" (Climate And Weather of the Sun Earth System) initiative.

Note 1: This OCR is a re-issue of the original OCR_33 which was withdrawn due to conflicts with the IPY POLARCAT campaigns.

Note 2: Since analysis of the re-issued OCR has shown that the requested parameter settings cannot be realised, modified PET and co-adding parameters have been provided by the originator (e-mail S.Noël, dated March 11, 2008). These form the basis for any further analysis. The text above has not been updated w.r.t. the modifications but they can be found in the SOST analysis chapter.

Originator: M. Rapp (IAP Kühlungsborn), C. von Savigny (IUP Bremen)	Date of Issue: 2008-02-20	Signature: CvS 2008-02-20

Assessment of SSAG (necessary for requests by scientists):

The proposed operations change will allow the validation of SCIAMACHY NLC particle size data and is an important contribution to the international SCOSTEP-CAWSES initiative. The analysis of the OCR is strongly recommended. Options should be investigated which minimise the impact on nadir coverage for NH polar latitudes, as in parallel there are IPY POLARCAT campaigns requesting SCIA nadir data.

SSAG: H. Bovensmann	Date: 28.2.2008	Signature: e-mail, 28.2.2008
Classification of OCR: D		

OCR Analysis (incl. Implementation Option):

The implementation of this OCR requires state parameter modifications and planning optimization.

State parameters:
Between June 30th and July 13th the limb states with ID 29-32 are executed above 60 deg N. Generally therefore PETs and co-adding factors for these states, i.e. PET table (entries 29-32) and co-adding index tables 2-5 need to be changed.

The **originally required integration times (re-issued OCR) could not be implemented** since

- The design of the limb-state in general does not permit any integration below 3 BCPS (RESET of integration required for elevation step!)
- Only integer multiples of 1 BCPS can be realized. 16 readouts per limb-scan correspond to 1.5 BCPS, which is below the limit given above.
- States 30, 31 and 32 are presently such designed, that the data rate is 20 kb/s below the maximum rate. Reducing the PET in channel 1 by a factor 8 and co-adding for clusters 15 and 20 by a factor 2 would result in a violation of the data rate limit (T_{int} of other clusters would have to be increased to stay below the limit!).

After discussions with the OCR originator new integration times were suggested. In summary they finally required the following PET/co-adding settings:

- State 29, 30, 31 and 32:
  - PET for channel 1a & 1b to be set to 0.1875 sec
  - Co-adding table 2, 3, 4 and 5 (to keep data rate below the upper limit): select co-adding factors such that an integration time T_{int} of
    - 0.1875 sec is achieved in clusters 3 & 4
    - 1.5 sec is achieved in unused/blinded/straylight clusters and ch.7 & 8
    - for state 30 it is additionally required to set PET of channel 7 to 1.5 sec (note that this setting will probably result in saturation for channel 7 of state 30, but for the duration of this OCR this is acceptable)

Details of these settings can be found in annex 1 and annex 2. The modifications were checked using different tools. Conflicts with other states using also co-adding tables 2 to 5 are excluded via planning i.e. they are not executed when OCR_33 is running.

Planning optimization:
This occurs in the same way as for previous similar OCRs, i.e. SOST will run the planning process twice. If Andoya coverage orbits do not show a limb state over this site (note: due to the limb/nadir matching it is equivalent to get a nadir state over Andoya), the planned limb/nadir sequence will be exchanged by using the timeline with the opposite limb/nadir sequence. This gives a high probability for Andoya limb coverage. The only minor drawback is that such orbits modify the sequence 1 / sequence 2 pattern of nadir and limb states.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 07/03/2008 supplement 13/03/2008	Signature: via E-mail 07/03/2008 via E-mail 13/03/2008

Approval of Proposed Implementation:		
Originator Approval: C. von Savigny	Date: 14.3.08	Signature: e-mail 14.3 08
SSAG Approval:Heinrich Bovensmann	Date: 27.3 08	Signature: e-mail 27.3.08
Decision / Approval: The OCR shall be implemented as proposed by SOST.		
DLR Approval: Ch. Chlebek	Date: 3.5.08	Signature: e-mail 3.5.08
Implementation by SOST: Between orbits 33108 (June 30th) and 33309 (July 14th) the 4 co-adding tables 2,3,4,5 and PET tables for limb02, limb03, limb04, limb05 will be temporarly modified as listed in annex 2. In the same period OSDF generation optimizes nadir coverage over Andoya as described above.		
SOST: M. Gottwald, E. Krieg, DLR-IMF	Date: 07/05/08	Signature: via e-mail 07/05/08

Annex 1:

Summary of results							L2
State						L2	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel			1a	8	0,1875	1,5
2	straylight	213,29	239,88	1a	8	0,1875	1,5
3	virtual channel 1a	240,00	281,90	1a	1	0,1875	0,1875
4	virtual channel 1b	282,01	313,92	1b	1	0,1875	0,1875
5	unused pixel	314,03	333,80	1b	8	0,1875	1,5
6	Blinded Pixel			1b	8	0,1875	1,5
7	Blinded Pixel			2b	2	0,75	1,5
8	unused pixel	411,63	404,07	2b	2	0,75	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,75	0,75
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel			2a	1	1,5	1,5
13	Blinded Pixel			3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel			3	24	0,0625	1,5
18	Blinded Pixel			4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel			4	24	0,0625	1,5
23	Blinded Pixel			5	8	0,1875	1,5
24	unused pixel	774,73	775,94	5	8	0,1875	1,5
25	Channel 5 (main part)	776,24	1056,25	5	2	0,1875	0,375
26	unused pixel	1056,53	1061,40	5	8	0,1875	1,5
27	Blinded Pixel			5	8	0,1875	1,5
28	Blinded Pixel			6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel			6	24	0,0625	1,5
33	Blinded Pixel			7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel			7	1	1,5	1,5
38	Blinded Pixel			8	1	1,5	1,5
39	Channel 8	2260,61	2384,49	8	1	1,5	1,5
40	Blinded Pixel			8	1	1,5	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							371850

		Summary of results					L3
State						L3	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel			1a	8	0,1875	1,5
2	straylight	213,29	239,88	1a	8	0,1875	1,5
3	virtual channel 1a	240,00	281,90	1a	1	0,1875	0,1875
4	virtual channel 1b	282,01	313,92	1b	1	0,1875	0,1875
5	unused pixel	314,03	333,80	1b	8	0,1875	1,5
6	Blinded Pixel			1b	8	0,1875	1,5
7	Blinded Pixel			2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel			2a	4	0,375	1,5
13	Blinded Pixel			3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel			3	24	0,0625	1,5
18	Blinded Pixel			4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel			4	24	0,0625	1,5
23	Blinded Pixel			5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel			5	4	0,375	1,5
28	Blinded Pixel			6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel			6	24	0,0625	1,5
33	Blinded Pixel			7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel			7	1	1,5	1,5
38	Blinded Pixel			8	4	0,375	1,5
39	Channel 8	2260,61	2384,49	8	4	0,375	1,5
40	Blinded Pixel			8	4	0,375	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							376607

Summary of results L4

State						L4	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel			1a	8	0,1875	1,5
2	straylight	213,29	239,88	1a	8	0,1875	1,5
3	virtual channel 1a	240,00	281,90	1a	1	0,1875	0,1875
4	virtual channel 1b	282,01	313,92	1b	1	0,1875	0,1875
5	unused pixel	314,03	333,80	1b	8	0,1875	1,5
6	Blinded Pixel			1b	8	0,1875	1,5
7	Blinded Pixel			2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel			2a	4	0,375	1,5
13	Blinded Pixel			3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel			3	8	0,1875	1,5
18	Blinded Pixel			4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel			4	8	0,1875	1,5
23	Blinded Pixel			5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel			5	4	0,375	1,5
28	Blinded Pixel			6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel			6	8	0,1875	1,5
33	Blinded Pixel			7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel			7	4	0,375	1,5
38	Blinded Pixel			8	4	0,375	1,5
39	Channel 8	2260,61	2384,49	8	4	0,375	1,5
40	Blinded Pixel			8	4	0,375	1,5
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							382068

Summary of results L5

State						L5	
Cluster Ind.	**Description**	**min/max wavelength , nm**		**Channel**	**Coadding**	**PET (s)**	**Int. Time(s)**
1	Blinded Pixel			1a	8	0,1875	1,5
2	straylight	213,29	239,88	1a	8	0,1875	1,5
3	virtual channel 1a	240,00	281,90	1a	1	0,1875	0,1875
4	virtual channel 1b	282,01	313,92	1b	1	0,1875	0,1875
5	unused pixel	314,03	333,80	1b	8	0,1875	1,5
6	Blinded Pixel			1b	8	0,1875	1,5
7	Blinded Pixel			2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel			2a	4	0,375	1,5
13	Blinded Pixel			3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel			3	8	0,1875	1,5
18	Blinded Pixel			4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel			4	8	0,1875	1,5
23	Blinded Pixel			5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel			5	4	0,375	1,5
28	Blinded Pixel			6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel			6	8	0,1875	1,5
33	Blinded Pixel			7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel			7	4	0,375	1,5
38	Blinded Pixel			8	4	0,375	1,5
39	Channel 8	2260,61	2384,49	8	4	0,375	1,5
40	Blinded Pixel			8	4	0,375	1,5
41							
42							
43							
44							
45							
46							
47							
48							
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52							
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							**382068**

Annex 2:

Coadding Index table 02 to 05:

CO_ADDING	2								
Cluster Index	1	2	3	4	5	6	7	8	
Co_Adding Factor	8	8	1	1	8	8	2	2	OCR_033
Cluster Index	9	10	11	12	13	14	15	16	
Co_Adding Factor	1	1	1	1	24	24	6	24	changed for FF01
Cluster Index	17	18	19	20	21	22	23	24	
Co_Adding Factor	24	24	24	6	24	24	8	8	
Cluster Index	25	26	27	28	29	30	31	32	
Co_Adding Factor	2	8	8	24	24	6	24	24	
Cluster Index	33	34	35	36	37	38	39	40	
Co_Adding Factor	1	1	1	1	1	1	1	1	
Cluster Index	41	42	43	44	45	46	47	48	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	49	50	51	52	53	54	55	56	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	57	58	59	60	61	62	63	64	
Co_Adding Factor	0	0	0	0	0	0	0	0	

CO_ADDING	3								
Cluster Index	1	2	3	4	5	6	7	8	
Co_Adding Factor	8	8	1	1	8	8	4	4	OCR_033
Cluster Index	9	10	11	12	13	14	15	16	
Co_Adding Factor	1	1	4	4	24	24	6	24	
Cluster Index	17	18	19	20	21	22	23	24	
Co_Adding Factor	24	24	24	6	24	24	4	4	
Cluster Index	25	26	27	28	29	30	31	32	
Co_Adding Factor	1	4	4	24	24	6	24	24	
Cluster Index	33	34	35	36	37	38	39	40	
Co_Adding Factor	1	1	1	1	1	4	4	4	OCR_033
Cluster Index	41	42	43	44	45	46	47	48	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	49	50	51	52	53	54	55	56	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	57	58	59	60	61	62	63	64	
Co_Adding Factor	0	0	0	0	0	0	0	0	

CO_ADDING	4								
Cluster Index	1	2	3	4	5	6	7	8	
Co_Adding Factor	8	8	1	1	8	8	4	4	OCR_033
Cluster Index	9	10	11	12	13	14	15	16	
Co_Adding Factor	1	1	4	4	8	8	2	8	
Cluster Index	17	18	19	20	21	22	23	24	
Co_Adding Factor	8	8	8	2	8	8	4	4	
Cluster Index	25	26	27	28	29	30	31	32	
Co_Adding Factor	1	4	4	8	8	2	8	8	
Cluster Index	33	34	35	36	37	38	39	40	
Co_Adding Factor	4	4	4	4	4	4	4	4	OCR_033
Cluster Index	41	42	43	44	45	46	47	48	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	49	50	51	52	53	54	55	56	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	57	58	59	60	61	62	63	64	
Co_Adding Factor	0	0	0	0	0	0	0	0	

CO_ADDING	5								
Cluster Index	1	2	3	4	5	6	7	8	
Co_Adding Factor	8	8	1	1	8	8	4	4	OCR_033
Cluster Index	9	10	11	12	13	14	15	16	
Co_Adding Factor	1	1	4	4	8	8	2	8	
Cluster Index	17	18	19	20	21	22	23	24	
Co_Adding Factor	8	8	8	2	8	8	4	4	
Cluster Index	25	26	27	28	29	30	31	32	
Co_Adding Factor	1	4	4	8	8	2	8	8	
Cluster Index	33	34	35	36	37	38	39	40	
Co_Adding Factor	4	4	4	4	4	4	4	4	OCR_033
Cluster Index	41	42	43	44	45	46	47	48	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	49	50	51	52	53	54	55	56	
Co_Adding Factor	0	0	0	0	0	0	0	0	
Cluster Index	57	58	59	60	61	62	63	64	
Co_Adding Factor	0	0	0	0	0	0	0	0	

Pixel Exposure Time for states ID 29 to 32:

A	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ
	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Limb 02	29	Low	,1875	,1875	,75	1,5	,0625	,0625	,1875	,0625	1,5	1,5	29	High	1,5	1,5	,75	1,5	,0625	,0625	,1875	,0625	1,5	1,5	OCR_33
Limb 03	30	Low	,1875	,1875	,375	,375	,0625	,0625	,375	,0625	1,5	,375	30	High	1,5	,375	,375	,375	,0625	,0625	,375	,0625	,375	,375	OCR_33
Limb 04	31	Low	,1875	,1875	,375	,375	,1875	,1875	,375	,1875	,375	,375	31	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,375	OCR_33
Limb 05	32	Low	,1875	,1875	,375	,375	,1875	,1875	,375	,1875	,375	,375	32	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,375	OCR_33

OCR_34: Improved Limb Coverage for the Teresina Balloon Campaign

SCIAMACHY	**Operation Change Request**	OCR No: 34 Issue: A
Title: Improved Limb Coverage for the Teresina Balloon Campaign		

<u>Description of Request:</u>

In the period 12 May 2008 to 06 June 2008, a balloon campaign will be performed in Teresina, Brazil, 05°03' S, 42°29' W.

ESA is supporting the campaign for the validation of ENVISAT products. The balloon payloads include SOLOMON, LPMA/DOAS, SPIRALE, and MIPAS. The data from the measurements can be used for the validation of SCIAMACHY products, in particular the Limb retrievals. During the validation meeting 22 January 2008, SCIAVALIG supported the proposal to support this campaign as source of validation information for SCIAMACHY

In order to achieve an optimal coverage during the campaign period, it is requested to adjust the SCIAMACHY mission planning to have a maximum coverage of limb and nadir states over Teresina for the duration of the campaign.

Note: Due to a shift in the balloon schedule this OCR shall be applicable for the time period 26 May to 30 June 2008.

Originator: T. Fehr, ESA	Date of Issue: 30/01/08	Signature: via e-mail 30/01/08

<u>Assessment of SSAG (necessary for requests by scientists):</u>

The SCIAVALIG Meeting om January 22, 2008 recommended the investigation of the OCR.

SSAG: H. Bovensmann	Date: 28.2.2008	Signature: e-mail, 28.2.2008
Classification of OCR: D		

<u>OCR Analysis (incl. Implementation Option):</u>

The implementation of this OCR requires planning optimization. The optimization occurs in the same way as for previous similar OCRs, i.e. SOST will run the planning process twice. If Teresina coverage orbits do not show a limb state over this site (note: due to the limb/nadir matching it is equivalent to get a nadir state over Teresina), the planned limb/nadir sequence will be exchanged by using the timeline with the opposite limb/nadir sequence. This gives a high probability for Teresina limb coverage. The only minor drawback is that such orbits modify the sequence 1 / sequence 2 pattern of nadir and limb states.

SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 06/03/08	Signature: via e-mail 06/03/08
Approval of Proposed Implementation:		
Originator Approval: T. Fehr	Date: 05/05/08	Signature: via e-mail 05/05/08
SSAG Approval: H. Bovensmann	Date: 11/03/08	Signature: via e-mail 11/03/08

<table>
<tr><td colspan="3"><u>Decision / Approval:</u>
The OCR shall be implemented as proposed.
If Possible the schedule for the implementation shall be adapted (see e-mail T. Fehr, 5.5.08)</td></tr>
<tr><td>DLR Approval:
Ch Chlebek</td><td>Date:09/05/08</td><td>Signature: via e-mail 09/05/08</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>
In the OSDF for the period May 26th – June 30th the timelines in the Teresina relevant orbits include the limb/nadir sequence which provides maximum coverage at Teresina. This is ensured by having run SOST's simulation of the mission planning schedule twice, having identified cases where the sequence was unsuitable and exchanged the sequence by the opposite limb/nadir sequence. In total 34 orbits have been identified with fair to good Teresina coverage. They are listed in the annex. Due to Teresina's close location at the equator, Teresina overpasses occur about 3040 sec after ANX.
The planning for the period June 1st – June 30th has been updated to reflect the modified balloon campaign schedule (original OSDF 34_20 was sent to RGT end of April) on May 8th by submitting the modified OSDF 34_21 to RGT.</td></tr>
<tr><td>SOST: M. Gottwald, DLR-IMF</td><td>Date: 08/05/08</td><td>Signature: via e-mail 08/05/08</td></tr>
</table>

Orbits over Teresina (Nadir Swath +/- 480 km)		
Time: 12-MAY-2005/30-JUN-2008		
Orbit	Longitude (ANX)	ANX (UTC)
32428	148.9	13-MAY-2008 12:04:31
32442	156.7	14-MAY-2008 11:32:54
32471	147.4	16-MAY-2008 12:10:15
32485	155.3	17-MAY-2008 11:38:38
32514	146.0	19-MAY-2008 12:16:00
32528	153.9	20-MAY-2008 11:44:23
32557	144.5	22-MAY-2008 12:21:45
32571	152.4	23-MAY-2008 11:50:08
32585	160.3	24-MAY-2008 11:18:31
32614	151.0	26-MAY-2008 11:55:53
32628	158.9	27-MAY-2008 11:24:16
32643	141.6	28-MAY-2008 12:33:15
32657	149.5	29-MAY-2008 12:01:38
32671	157.4	30-MAY-2008 11:30:01
32700	148.1	01-JUN-2008 12:07:23
32714	156.0	02-JUN-2008 11:35:46
32729	138.8	03-JUN-2008 12:44:45
32743	146.7	04-JUN-2008 12:13:08
32757	154.6	05-JUN-2008 11:41:31
32786	145.2	07-JUN-2008 12:18:53
32800	153.1	08-JUN-2008 11:47:16
32829	143.8	10-JUN-2008 12:24:38
32843	151.7	11-JUN-2008 11:53:01
32857	159.6	12-JUN-2008 11:21:24
32886	150.3	14-JUN-2008 11:58:46
32900	158.2	15-JUN-2008 11:27:09
32929	148.8	17-JUN-2008 12:04:31
32943	156.7	18-JUN-2008 11:32:54
32972	147.4	20-JUN-2008 12:10:15
32986	155.3	21-JUN-2008 11:38:38
33015	146.0	23-JUN-2008 12:16:00
33029	153.9	24-JUN-2008 11:44:23
33058	144.5	26-JUN-2008 12:21:45
33072	152.4	27-JUN-2008 11:50:08
33086	160.3	28-JUN-2008 11:18:31
33115	151.0	30-JUN-2008 11:55:53

Table: ENVISAT orbits with good to fair nadir ground pixel coverage at Teresina

OCR_35: Changing Integration Time for Cluster 16 an 18 (channel 3) for 20 April 2008 to 17 May 2008 to 0.25 or Shorter for Nadir

SCIAMACHY	**Operation Change Request**	OCR No: 35 Issue: A

Title: Changing Integration Time for Cluster 16 an 18 (channel 3) for 20 April 2008 to 17 May 2008 to 0.25 or Shorter for Nadir

Description of Request:

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32 last year. First results from analysing SCIA data from Nov 2007 indicate that the former operation change OCR 032 was successful (see annexed figures): we can, with using the entire data set from ~530 to 595 nm for DOAS analysis, resolve the absorption of the phycoerythrin-containing Synechococcus (a dominating phytoplankton species in tropical areas) and distinguish the global abundance of this species with a much better coverage and higher spatial resolution. With resolving Synechococcus distributions from SCIAMACHY data, this enables to distinguish this species from other cyanobacteria species and helps to improve phytoplankton biomass estimates and marine nutrient flux studies.

In normal operation the integration time in clusters 16 and 18 of around 1 sec is not enough to get highly spatially resolved results for further phytoplankton modelling approaches. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups. We choose the time of April 20, 2008 to May 17, 2008, because then we are measuring online in the Atlantic Ocean between 20°N and 25°S in situ phytoplankton characteristics during a ship cruise (on Research Vessel Polarstern, Ant XXIV-4) which are necessary data for validation of these specific phytoplankton retrieval. It is sufficient to fullfil the above requirements only for solar zenith angles smaller 60°.

Originator: Astrid Bracher, IFE	Date of Issue: 2008-02-20	Signature: A. Bracher by email 2008-02-20

Assessment of SSAG (necessary for requests by scientists):

The proposed change, as long as not conflicting with the nominal measurement sequence and not affecting the quality of the data products, is an unique (there is no other sensor in space to do it) opportunity to test phytoplankton retrieval using high spectrally resolved reflectance data. Therefore it is recommended to investigate the implementation of the proposed temporary change.

SSAG: H. Bovensmann	Date: 28.2.2008	Signature: e-mail 28.2.2008

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

The following analysis is derived from OCR_32 executed in November 2007. A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15, 16, 17 and 18.

The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters.
(Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30 km x 60 km, 1 s to about 30 km x 240 km.)

Since OCR_32 was implemented using the then proposed option 2, also OCR_35 shall follow the same approach.

Increase integration times of "non-special" clusters in channel 7 (48, 49, 51, 53) and blinded pixels in channel 6 (36,47) to 5s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above

Since the implementation involves CTI-tables only and no MPS-activities the proposed timeslot April 20, 2008 to May 17, 2008 can be met. We will upload the modified CTI parameter tables in orbit 32092 (April 20, 2008) and switch back to the final flight configuration in orbit 32493 (May 18, 2008).

SOST: E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 27.02.2008	Signature: email 27.02.2008 Update: email 07.03.2008
Approval of Proposed Implementation:		
Originator Approval: A. Bracher	Date: 07/03/08	Signature: via e-mail 07/03/08
SSAG Approval: H. Bovensmann	Date: 28.2.2008	Signature: e-mail, 28.2.2008

Decision / Approval:

It is recommended to implement this OCR in the same way as already successfully tested to work for OCR_32. Data users need to be informed in advance on this temporary change of integration times (Action ESA).

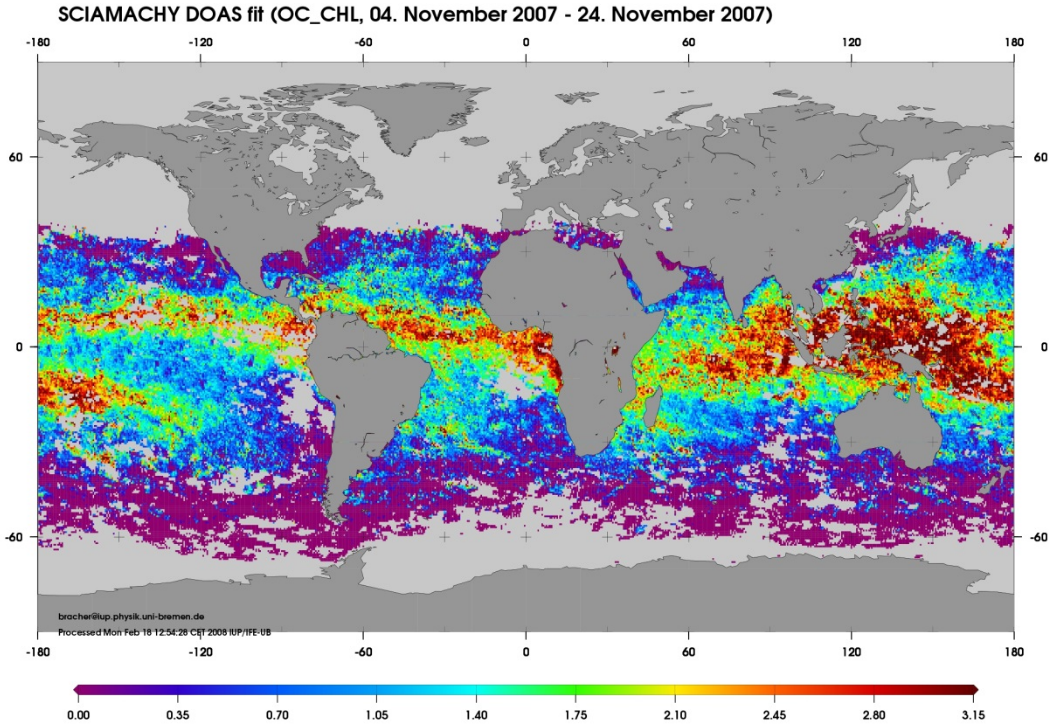
DLR Approval: Ch. Chlebek	Date: 4.3.2008	Signature: e-mail, 4.3.2008

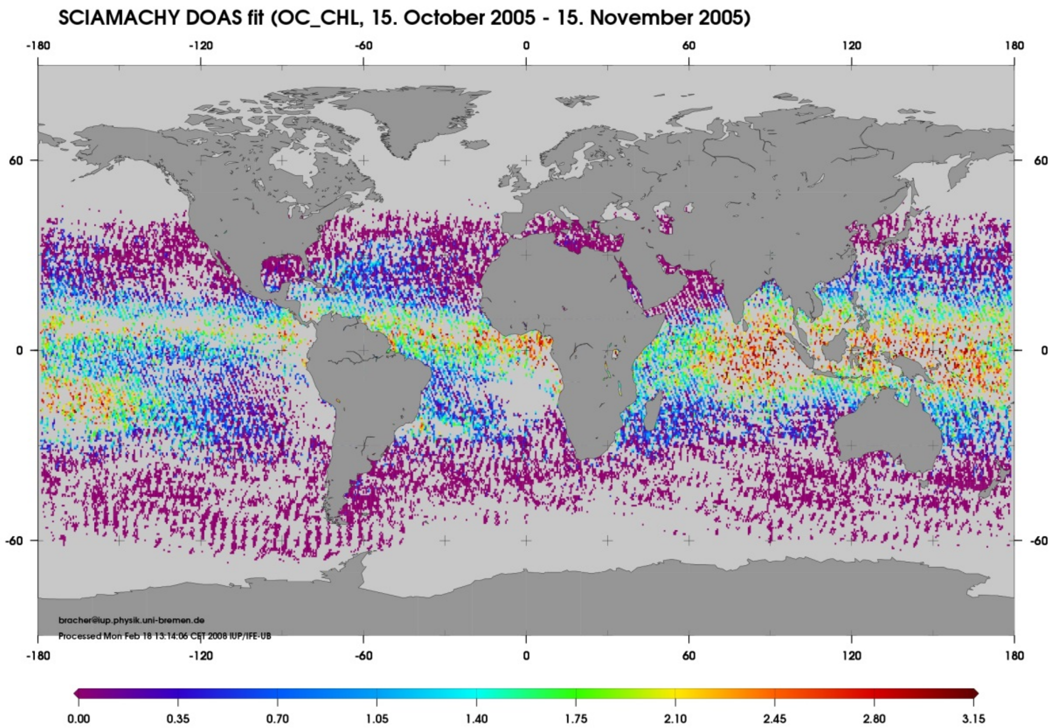
Implementation by SOST:

According to option 2 in OCR_32 coadding tables 26 and 27 will be modified as specified in tables N6 and N7 of annex 2.
Start orbit for the execution of OCR_35 is 32092 (April 20, 00:48 UTC), Stop orbit is 32493 (May 18, 01:06 UTC).

SOST: E.Krieg	Date: 12.03.2008	Signature: e-mail, 12.3.2008

Annex 1:


SCIAMACHY DOAS fit (OC_CHL, 04. November 2007 - 24. November 2007)
-180
-120
-60
0
60
120
180
60
0
-60
bracher@iup.physik.uni-bremen.de
0.00
0.35
0.70
1.05
1.40
1.75
2.10
2.45
2.80
3.15


SCIAMACHY DOAS fit (OC_CHL, 15. October 2005 - 15. November 2005)
-180
-120
-60
0
60
120
180
60
0
-60
bracher@iup.physik.uni-bremen.de
0.00
0.35
0.70
1.05
1.40
1.75
2.10
2.45
2.80
3.15

Annex 2:

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	2	0,25	0,5
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	4	0,125	0,5
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							386333

Summary of results N7

State						N7	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
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17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,125	0,25
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	40	0,125	5
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
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46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	40	0,125	5
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	10	0,5	5
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	10	0,5	5
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390784

The maximum data rate of 390000 bits/s is slightly exceeded. This is considered to be uncritical since nadir states with data rates up to 391034 bits/s have already been run successfully.

OCR_36: SCIAMACHY Limb Measurements in the Mesosphere and Lower Thermosphere

	Operation Change Request	OCR No: 36
		Issue: A

Title: SCIAMACHY Limb Measurements in the Mesosphere and Lower Thermosphere

Description of Request:

A number of trace gas emissions can be identified in the upper mesosphere in the SCIAMACHY limb measurements, including NO from the γ-bands, OH at ~ 308 nm, O_2, Mg, Mg^+, atomic oxygen, O^+, Fe, Fe^+, and Na. A tomographic retrieval algorithm using all daytime limb and nadir measurements of one orbit for mesospheric emission species has been developed at the Institute of Environmental Physics, University of Bremen, and has so far been applied successfully to the metallic species Mg and Mg^+. This retrieval code enables us to retrieve altitude profiles of mesospheric and thermospheric emitters up to around 400 km of altitude, but with a very limited vertical resolution above the altitude of the highest limb-scan at around 93 km.

A number of the species mentioned above have significant contributions in the lower thermosphere, between 90-150 km, above the highest SCIAMACHY limb altitude. This is especially true for O, NO and the metals and metal ions. A new state was therefore defined in OCR_30 with limb-scans shifted to the lower ionosphere, scanning the altitude range of 60 - 150 km instead of from the surface up to ~ 93 km as in the normal SCIAMACHY limb mode. Measurements in this new state were carried out during 20 orbits on August 8 and 9, 2007 (orbits 28433 - 28452). These measurements show very clear emission features between 95 - 150 km altitude especially from Mg^+, Mg, O and NO. Examples of line emissivities of several trace gases as well as number densities of Mg/Mg^+ derived from these orbits are shown and discussed in Annex 1. These data show that measurements in the new SCIAMACHY mesosphere/thermosphere state work very well, and have the potential to greatly increase our knowledge of a fairly unknown atmospheric region, the upper mesosphere/lower thermosphere region. Continuous measurements with this state will especially improve our knowledge of atmospheric metals and metal ions, which have been measured for the first time on a global scale by SCIAMACHY (see Scharringhausen et al, 2007; 2008), but which have a large contribution from the lower ionosphere, a region at the moment not covered by SCIAMACHY (see also letters of recommendation from Prof. John Plane, University of Leeds, UK, and Dr. A. Aikin, The Catholic University of America, Washington, DC). Also, regular measurements covering the lower ionosphere will improve SCIAMACHY measurements of NO and ozone from the O_2 bands as they make it possible to control how well the 2D retrieval covers the ionospheric impact. This is especially important as SCIAMACHY to our knowledge is the only instrument that has the capacity to measure NO in the upper mesosphere, a region where NO is supposed to be highly variable due to transport from the lower thermosphere as well as due to the impact of energetic particle precipitation events.

SCIAMACHY measurements of NO in the mesosphere / lower thermosphere region have the potential to investigate the impact of both processes and their role for the stratospheric NOy budget for a long time-period and on a global scale; these data will provide important input in research related to solar-climate interactions as, e.g., the international research program CAWSES (Climate and weather of the sun-earth system) propagated by SCOSTEP (www.scostep.ucar.edu).

Description of Request (continued): Therefore, we request the following change: To change the setting of the limb sequence to the 'mesosphere-thermosphere' state defined in OCR_30 for a number of 30 orbits per month on a regular basis from spring 2008 on until the end of the SCIAMACHY operation period. The 30 orbits can be spaced either directly after each other or into two bins of 15 orbits each. This will provide a reasonable global distribution for every measurement period of the new state, even if the coverage is not very good. The amount of data collected from spring 2008 to the end of the SCIAMACHY measurement period in 2012 or even 2013 will provide a unique database of species in the lower ionosphere; especially for the metals and metal ions, no other instrument provides comparable measurements in this altitude region and on a global scale.		
Originator: M. Sinnhuber, IFE	Date of Issue: 2008-02-26	Signature: MS 2008-02-26
Assessment of SSAG (necessary for requests by scientists): As recommended by John Plane and Arthur C. Aiken in their support letters, the regular (monthly) execution of UMLT measurements will allow to make unique contributions to our understanding of MULT processes. The analysis of the OCR is therefore strongly recommended. A final decision on implementation has to take into account the impact on the nominal limb measurements.		
SSAG: H. Bovensmann, IFE	Date: 28.2.2008	Signature: via e-mail 28.2.2008
Classification of OCR: C		
OCR Analysis (incl. Implementation Option): The identical 'test' in OCR_30 was implemented via a temporary modification of certain state parameters. This would also be an option here but since OCR_36 requires to execute on a routine basis about 30 orbits per month it is strongly recommended to implement OCR_36 via permanent modifications. These impact – Mission scenarios: Introduce regular mesosphere/thermosphere measurements thus reducing the number of regular limb measurements – States: For a permanent implementation a dedicated mesosphere_thermosphere state has to become part of the set of 70 on-board states – Timelines: Regular execution of the mesosphere_thermosphere state requires the definition of new permanent timelines. Mission scenarios: The 30 orbits with the mesosphere_thermosphere measurements shall be executed as one block per month in the time period when no subsolar measurements are planned. This reduces the need for defining a large number of new timelines. States: One of the currently unused states has to be overwritten permanently thus defining a new state Limb_Mesosphere_Thermosphere (lmt01). Prime candidate is state ID 55 (Moon_Pointing_Troposphere, mop03) since in the past it was shown that the moon_troposphere state cannot be executed due to the low altitude of the moon which confuses the Sun Follower. An alternative would be one of the nadir small swath width (e.g. nad09) or limb small swath width states. No orbital phase dependency exists for the new state mesosphere_thermosphere state, i.e. one single state is sufficient to cover the complete illuminated part of the orbit.		

OCR Analysis (continued):

Parameter settings of the mesosphere_thermosphere state include

- Basic profile: Currently no spare basic profile exists. Two options are proposed
  - Use profile from limb_mesosphere state: The scan would start in the thermosphere at 150 km and step downwards to the requested minimum altitude at 60 km. It has to be decided whether this approach is suitable for data analysis. A dark current measurement at an altitude of 250 km is inserted at the end of the state.
  - Modify elevation basic profile 3 to provide a height level of 60km above horizon: This profile is presently used in 7 Sun and moon observation states. All 7 states are executed using the target data provided with the START TIMELINE MCMD. Thus in all these states the position defined by the basic profile is overwritten by information produced by the PMC in those scan phases, when the SF-system is controlling the mirror position. This is the case for all 7 states using elevation basic profile 3. Using basic profile 3 may require a thorough test phase to ensure that none of the Sun and moon measurements is indeed affected.
- PET values: These will be set to channel 1 = 1.5 sec, channel 2 = 1.5 sec, channels 3-6 = 0.375 sec, channels 7 & 8 = 1.5 sec (according to e-mail dated March 27th).
- Co-adding table: All co-adding factors are set to 1 sec (according to e-mail dated March 27th).
- State index table: Depending on which state will be modified the corresponding index for the co-adding table used will be updated, if needed.

Timelines:

Two new timelines are required permanently on-board for measurements after the SO&C window. They are the equivalents to t/l 47 and 50 and include the new mesosphere_thermosphere state which replaces all other limb states. One of the t/l IDs is 14 (the unused moon_troposphere t/l), the other will be t/l 15. In addition, the 4 limb states usually executed before sunrise shall also scan the mesosphere and thermosphere. Therefore two more timelines are required. These are t/l 1 and 2 with subset 02 which are exchanged whenever limb_mesosphere_thermosphere measurements are planned. A new timeline set 35 will be generated and uploaded whit the permanent implementation of OCR_36.

Note: It is planned to synchronize SCIAMACHY's mesosphere_thermosphere measurements with MIPAS' upper atmosphere observations. This requires an informal mission planning interface between SOST and RGT/ESRIN.

It is proposed to implement the modified state as a test state first and execute it in a test timeline (t/l set 9) for about 14 orbits. Timeframe of test timeline scheduling depends on OCR acceptance. Once data analysis has confirmed correct functioning of the state configuration, the complete new timeline set 35 shall be generated and uploaded for routine operations.

SOST: M.Gottwald, E.Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 31/03/08	Signature: via e-mail 31/03/08
Approval of Proposed Implementation:		
Originator Approval: M. Sinnhuber, IFE	Date:05/06/08	Signature: via e-mail 05/06/08
SSAG Approval: H. Bovensmann	Date:04/06/08	Signature: via e-mail 04/06/08

<table>
<tr><td colspan="3"><u>Decision / Approval:</u>

1. The modifies state shall be tested as proposed by SOST.
1a. The modified state test shall be extended until end October 2008
2. Decision for the final implementation will be given after SPEC approval</td></tr>
<tr><td>DLR Approval for the test:
Ch. Chlebek</td><td>Date: 06/06/08:</td><td>Signature: via e-mail 06/06/08</td></tr>
<tr><td>DLR Approval for the extended test phase: A. Friker</td><td>Date: 16/06/08:</td><td>Signature: via e-mail 16/06/08</td></tr>
<tr><td>SPEC approval for the final implementation
Prof. Dr. J. Burrows
Dr. I. Aben
H. Förster
Ch. Chlebek</td><td>

Date: 03/09/08
Date: 23/09/08
Date: 25/09/08
Date: 03/09/08</td><td>

Signature: via e-mail 03/09/08
Signature: via e-mail 23/09/08
Signature: via e-mail 25/09/08
Signature: via e-mail 03/09/08</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

Permanent implementation of OCR_36 occurs on November 3^{rd} in orbit 34922. Then new final flight configurations for states (FFS_081103) and timelines (FFT_081103) become applicable. The parameter settings are identical to those from the tests and are given in the annex.

With the new final flight configurations limb_mesosphere_thermosphere measurements are executed for 2 days per month. One day is correlated with MIPAS operating in Upper Atmosphere mode. The other is separated by about 15 days (depends on lunar visibility since limb_mesosphere_thermosphere observations can only be planned without moon measurements).</td></tr>
<tr><td>SOST: M. Gottwald, E. Krieg, DLR-IMF</td><td>Date: 01/10/08</td><td>Signature: via e-mail 01/10/08</td></tr>
</table>

Annex 1: Preliminary analysis of SCIAMACHY thermospheric observations during orbits 28433 – 28452 (OCR_30)

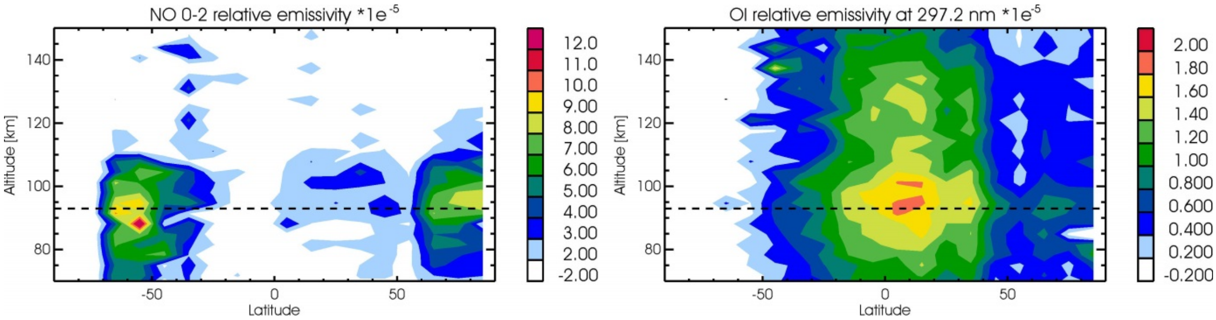

Figure 1: Relative emissivities of the NO 2-0 γ band at 245 nm (left) and the OI relative emission at 297.2 nm (right), obtained from 20 orbits of the new SCIAMACHY mesosphere-thermosphere mode. The dashed line shows the highest tangent altitude of the 'normal' SCIAMACHY limb mode.

A number of trace gas emissions can be identified in the upper mesosphere in the SCIAMACHY limb measurements, including NO from the γ-bands, OH at ~ 308 nm, O_2, Mg, Mg^+, atomic oxygen, O^+, Fe, Fe^+, and Na. A tomographic retrieval algorithm using all daytime limb and nadir measurements of one orbit for mesospheric emission species has been developed at the Institute of Environmental Physics, University of Bremen, and has so far been applied successfully to the metallic species Mg and Mg^+. This retrieval code enables us to retrieve altitude profiles of mesospheric and thermospheric emitters up to around 400 km of altitude, but with a very limited vertical resolution above the altitude of the highest limb-scan at around 93 km.

A number of the species mentioned above have significant contributions in the lower thermosphere, between 90-150 km, above the highest SCIAMACHY limb altitude. This is especially true for O, NO and the metals and metal ions. A new state was therefore defined in OCR 030 with limb-scans shifted to the lower ionosphere, scanning the altitude range of 60 - 150 km instead of from the surface up to ~ 93 km as in the normal SCIAMACHY limb mode. Measurements in this new state were carried out during 20 orbits on August 8 and 9, 2007 (orbits 28433 - 28452). First results from these orbits are shown in Figures 1 and 2.

In Figure 1, latitudinal averages over all 20 orbits of relative emissivities are shown for two emission lines observed in SCIAMACHY channel 1: the NO 2-0 γ band transition around 245 nm, and the OI transition at 297.2 nm. Relative emissions were obtained in the following way: first, spectra were divided by the solar spectrum of the same day. Then the spectral background resulting from Rayleigh scattering of solar radiation was fitted and subtracted, and finally, the average value of the three central channels of the resulting emission signal was obtained as the relative emissivity along the line-of-sight. The highest tangent altitude of the normal SCIAMACHY limb measurement mode is given as a dashed line around 93 km in both figures. As can be seen, both emission signals have significant contributions from altitudes above this line. NO has the strongest signals in polar latitudes around 90-105 km in the northern hemisphere, around 75 - 110 km in the southern hemisphere, where downwelling of NO into the polar winter mesosphere occurs. A secondary week peak of NO can be observed at 105 km altitude reaching from northern subtropics to middle latitudes. The atomic oxygen OI line shows the strongest signal in tropical and subtropical latitudes, where O is produced from O_2 photolysis. Maximal values occur around 95 km, but significant values reach up to around 140 km in the tropics.

In Figure 2, latitudinal averages of number densities of Mg and Mg^+ are shown retrieved from the emission lines around 280 nm respectively 285 nm, derived from the 20 orbits of the new mesosphere / thermosphere state. For comparison, latitudinal averages of the month July derived from SCIAMACHY measurements of the years 2002 - 2006 with the same retrieval routine but from the normal SCIAMACHY limb sequence which reaches up to only 93 km, are shown in Figure 3. Both retrievals reach up to around 400 km, the altitude information above the highest tangent altitude deriving from the tomographic type retrieval using overlapping limb and nadir measurements.

A number of features show up in both measurements, namely a layer of enhanced Mg^+ around 100 km altitude, and two upward reaching branches of enhanced Mg^+ values, one in northern polar regions, and one in northern subtropics. Though the process of upwelling of Mg^+ in polar regions is probably uplift in the Earth magnetic field, accompanying values of enhanced neutral Mg are observed in the same altitude range, probably produced by recombination reactions of Mg^+ with electrons. These features are more clearly observed in the new state, and the altitude of the Mg^+ and Mg layer can be determined more precisely than for the normal state, as the altitude resolution of the new state is much better above 93 km. Equally, peak values of the 100 km layer are much larger, because the vertical smoothing is so much better. Measurements of the new state show that the upwelling branch of polar Mg appears mainly at altitudes above 200 km, while upwelling of Mg^+ reaches over a much larger altitude range, from the layer at 100 km upwards. A new feature not observed in the normal state is the enhanced layer of Mg^+ between 150 and 200 km which also is accompanied by a similar layer of enhanced values of neutral Mg. As they occur mainly above the highest altitude of even the new mesosphere / thermosphere state, the information for this layer must come mainly from different total column contents of the limb- and nadir measurements. Though high values of Mg^+ have been observed by in-situ measurements in the mid-thermosphere before, these results are rather unexpected, and should be investigated in more detail.

These first results of SCIAMACHY measurements in the lower thermosphere already show that SCIAMACHY mesosphere-thermosphere measurements have a large potential of yielding new and unexpected insights into an atmospheric region that is still widely unkown. This is not only true for the metallic species Mg, Mg^+, Fe, Fe^+ and Na, but also for NO, O and O_3, which also are observed within the SCIAMACHY range.

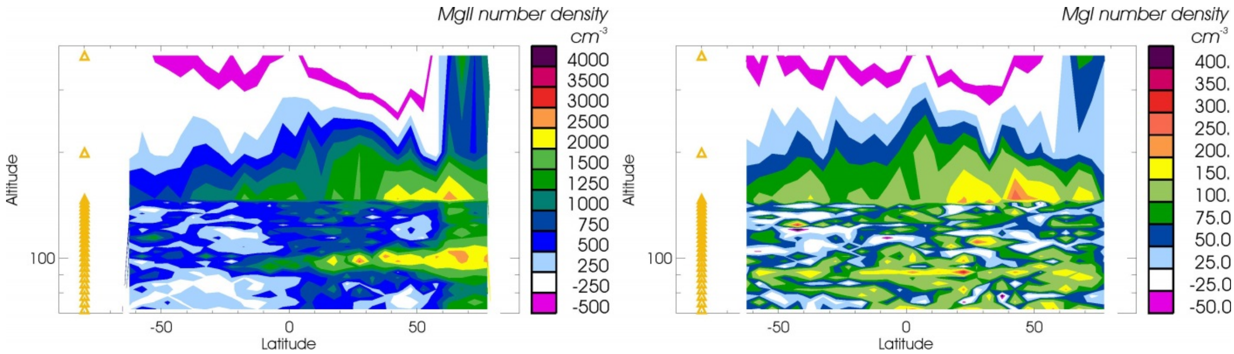

Figure 2: Left: latitudinal mean of Mg^+ number densities (cm^{-3}) obtained during orbits 28433-28452, the first 20 orbits of the SCIAMACHY mesosphere-thermosphere mode, carried out on August 8 and 9, 2007, averaged over 5° of latitude. Right: latitudinal mean of neutral Mg number densities obtained during the same orbits for the same latitudinal spacing. Yellow crosses show the centre of the retrieval altitude grid. Below 150 km, the vertical spacing of the retrieval grid reflects the spacing of limb tangent altitudes; above 150 km, the spacing reflects the altitude resolution of the tomographic retrieval.

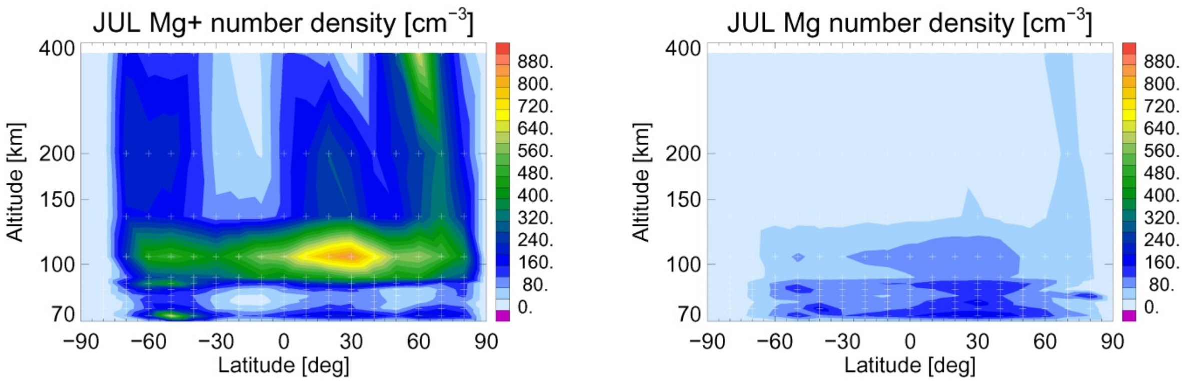

Figure 3: Latitudinal means of Mg^+ (left) and neutral Mg (right) for July for the years 2002-2006, obtained with the same retrieval as the measurements in Figure 1, but measured with the normal troposphere-stratosphere limb mode. White crosses denote the centres of the retrieval grid boxes. Adapted from [M. Scharringhausen, PhD thesis, University of Bremen, 2007].

Annex: Detailed State Design

This modified limb state shall be executed in the nominal limb observation direction. As starting height for the ESM is defined by basic profile 5, i.e. 150km, ASM position will be flight direction. The ASM scan motion will be as in a nominal limb state. The ESM steps will be executed in inverse direction compared to a nominal limb state to cover the specified height range. At the end of the 30 horizontal scans a step upwards of the ESM to a position at 350 km above the horizon still within the TCFoV takes place by using the modified ESM basic profile 3. This position will be maintained for a duration of 1.6875 sec to produce dark signals in pointing mode (no horizontal scans). PET and Co-adding factors are defined according to an e-mail dated March 27th

State events:

Time		Event	IFOV	
			altitude (km)	elevation (deg)
T0	0 sec	Start of measurement	150	24.47
T1	T0 + 50.625 sec	End 30 downward limb scans	60	26.24
T2	T0 + 50.875 sec	Start measurement in TcFoV (limb pointing at constant elevation) Dark Reference	350	20.00
T3	T0 + 52.313 sec	End measurement in TcFoV (limb pointing at constant elevation)	350	20.00

Table 1: Illustration of IFoV, LoS altitude and elevation for the different phases of the Limb Mesosphere_Thermosphere states. Due to the seasonal variations all figures are accurate to within several seconds only.

Details of the parameter settings follow below.

The following parameter tables are updated for state ID55 Limb Mesosphere_Thermosphere.

State duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait	
Limb_Mesosphere_Thermosphere	55	27	LIMB	837	13369	14303	172	changed duration (new state design) due to OCR_036

All times are set according to a nominal limb_state.

State Index:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Limb_Mesosphere_Thermosphere	55	1	10	10	27

Note:
A special measurement category is introduced to distinguish this state from a nominal limb-state.

PET Table:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Limb_Mesosphere_Thermosphere	55	Low	1,5	1,5	1,5	1,5	,375	,375	,375	,375	1,5	1,5

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Limb_Mesosphere_Thermosphere	55	High	1,5	1,5	1,5	1,5	,375	,375	,375	,375	1,5	1,5	**changed due to OCR_36**

Note:
Low rate only is applicable. Co-adding factors in all clusters is set to 1.

Scanner state parameter table:

Scanner State Parameter #55	55	Limb_Mesosphere_Thermosphere							
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	-006								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	004								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		1300,0	50625,0	250,0	1438,0	840,0	0,0	0,0	0,0
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		2	2	9	9	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	29	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		2	2	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		5	5	3	3	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	29	0	0	0	0	0	0

The timing is exactly as for standard limb-states but the elevation steps are executed towards horizon.

Scanner basic profile table:

Since the standard basic ESM profile 3 is defined in all SFS-states (47, 49, 50, 51, 54, 56, 57) but overwritten by the values of the *START_TL* MCMD, basic profile 3 is used to produce the required fixed height of 350km:

Scanner Basic Profile EU								
Basic	Basic Scan Rate		Basic Scan Position					
Scan	Azimuth	Elevation	Azimuth	Elevation				
Profile ID	[10-6 rad/sec]	[10-6 rad/sec]	[10-6 rad]	[10-6 rad]				
3	000131	000000	-0000471239	-174533		OCR_36	ESM-position 350km	

LMT (ID 55) timing inputs for timeline generation:

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	275 (762-636-23+172)
total RTCS-duration	762 cts
WME	13369 cts (31*27*16 +1 - 24)
WSR	172 cts
state duration	14303 cts (762+13369+172)

set-up	636 cts
cleanup	275 cts
measurement	13392 cts (31*27*16)
total duration	14303 cts
SDPU duration	837 bcps

phase 1	1300 msec
phase 2	50625 msec
phase 3	250 msec
phase 4	1438 msec
phase 5	840 msec

OCR_37: Slit Width Calibration

SCIAMACHY	**Operation Change Request**	OCR No: 37 Issue: A

Title: Slit Width Calibration

Description of Request:

Determine slit width in elevation direction using a small bright object, e.g. Venus. The accuracy of the slit width and scan speed determines the accuracy of the wavelength independent scaling factor with which the absolute irradiance of the moon can be determined, see OCR_25. In addition, the measurements can be used to refine instrument offset pointing to the platform which would improve limb pointing knowledge when so needed.

The intensity of Venus is estimated to be 1/1000 (rough order of magnitude) of a clouded nadir scene. For a single pixel in channel 3 a signal to noise ratio of several tens is expected for 1 second exposure time. Combination of data from all channels with significant signal, and multiple exposures should increase the signal to noise ratio significantly.
Scan size should be enough to cover the size of Venus and the width of the slit (0.016 + 0.045 degrees), scan step size between read-outs should preferably be 0.001 - 0.002 degrees. Multiple scans up and down over the light source are essential.

Originator: Ralph Snel	Date of Issue: April 18, 2008	Signature: RS

Assessment of SSAG (necessary for requests by scientists):

A precise knowledge of the slit function in elevation will be crucial for lunar calibration. The proposed measurement will also help to characterise small pointing offsets. In addition and not mentioned in the OCR, a better knowledge of the slit function in elevation will improve the quality of the limb retrieval for full mission reprocessing, as the FOV in elevation is illuminate inhomogeneously due to pressure gradient.

Taking all that together it is recommended to investigate implementation options and to perform this characterisation measurement when feasible and affordable.

SSAG: H. Bovensmann, IFE	Date: 16/09/2008	Signature: via e-mail 16/09/2008

Classification of OCR: D

OCR Analysis (incl. Implementation Option):

This OCR requires for the first time to observe another target than the Earth's atmosphere, Sun or moon. From a planning point of view Venus can be considered to be a point source. Two aspects have to be considered:

- visibility of Venus
- Line-of-Sight control during measurement

Because of the high pointing accuracy required we recommend to execute this OCR in two steps: first a test run to learn about pointing performance (predicted position of Venus, IFoV position, scan speed, etc.) and in a second or even third run, taking the lessons learned from the test into account, to perform the actual measurements.

OCR Analysis (continued):

1) Visibility of Venus (see Annex 1) and Timeline Definition

The second half of 2008 was not suited for Venus observations because the planet was either too close to the Sun or does not rise in the limb TCFoV. Measurements are possible in 2009 starting mid March.

The proposed test run should consist of 4 consecutive orbits in March and the second sequence (similar number of orbits) in June.

In March the ideal situation, i.e. Venus is trailing the Sun, occurs for about 2 weeks at the beginning of the 2009 visibility period. Venus can be found in the left part of the limb TCFoV. During the second or third sequence rise of Venus occurs after Sunrise but now with almost approx. maximum azimuth or maximum elevation difference between Venus above 100 km and the Sun (has already left limb TCFoV).

The proposed sequence of the timelines in the Venus observation orbits in March is as follows:

- t/l 02 (test t/l of set 09): Venus test observation starting at a Venus altitude of 100 km, i.e. Sun at about 36° (Note: although this is an unusual GEO_NUM value, the SCIACAL specification confirms its applicability. therefore the 'Venus' t/l can be constructed as a *Sun_fixed* timeline). The t/l ends when Venus reaches the upper edge of the limb TCFoV. Each Venus observation requires a separate timeline with an orbit specific GEO_NUM value since the relative elevation distance between Venus and Sun changes by about 1.3°/day, i.e. 0.09°/orbit.
- t/l 01 (test t/l of set 09): SO&C observation without preceding limb states
- t/l 47/50 (routine t/l of set 35): alternating limb/nadir measurements between end SO&C and eclipse start
- t/l 53/44 (routine t/l of set 35): eclipse phase

The proposed sequence of the timelines in the Venus observation orbits in June is as follows:

- t/l 01 (routine t/l of set 35): Sun in SO&C window preceded by 4 limb states
- test timelines of set 09: Venus observation starting at a Venus altitude of 100 km, i.e. Sun at 2.46° (Note: although this is an unusual GEO_NUM value, the SCIACAL specification confirms its applicability. therefore the 'Venus' t/l can be constructed as a *Sun_fixed* timeline). The t/l ends when Venus reaches the upper edge of the limb TCFoV. In June the relative elevation distance between Venus and Sun changes by about 0.6°/day, i.e. 0.04°/orbit. Whether this is sufficiently small to implement a single timeline can be judged once the data from the first sequence is available. Presently we assume that again 4 separate timelines are needed.
- t/l 47 & 50: (test timelines of set 09): alternating limb/nadir measurements between end Venus observation and start eclipse phase.
- t/l 53/44 (routine t/l of set 35): eclipse phase

We propose to schedule the Venus observations on March 20th, 2009 (day 443 in fig. 1, orbit 36873-37876 and June 25th, 2009 (day 540 in fig. 1, orbit 38261-38266). For the slit width measurements in June the start of the Venus t/l shall be exactly as derived from the reference orbit for 3 orbits. The remaining 3 orbits shall shift these t/l by 1 sec to compensate for the slight pointing inconsistency observed in the March test observations. This approach shall ensure that Venus is indeed scanned by the IFoV. Details about the applicable angular parameters and Venus ephemeris data can be found in Annex 2.

For the March observations 5 test timelines (set 09) are required. In June the same measurement can only be achieved with 8 test timelines (set 09).

2) Line-of-Sight Control (see Annex 2 and 3) For the duration of the OCR_37 measurements state ID 24 (nadir_pointing) will be temporarily overwritten. Five CT parameter tables are affected: – State Duration table – Scanner State parameter table – Basic Profile table (here compliance with other state executions needs to be considered) – Pixel Exposure Time table – State Index table The corresponding parameter values are listed in annex 3. Note that angular parameters in the basic profile table are preliminary and might undergo refinement as a result of further simulations.		
SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 01/12/08 Updated: 03/04/09	Signature: via e-mail 01/12/08
Approval of Proposed Implementation:		
Originator Approval: R. Snel, SRON	Date: 02/12/2008	Signature: via e-mail 02/12/2008
SSAG Approval: H. Bovensmann	Date: 16/09/2008 (for test in March) 15/04/2009 (for slit width measurement in June)	Signature: via e-mail 16/09/2008 (for test in March) via e-mail 15/04/2009 (for slit width measurement in June)
Decision / Approval: 1. The feasibility of the Venus measurements shall be tested as proposed by SOST. 2. Approval of the second measurement sequence in May/June has to await analysis of March test measurement. 3. June measurements to be scheduled avoiding interference with Cabauw campaign (OCR 040)		
DLR Approval: A. Friker	Date: 23/12/2008 (for test in March) 16/04/2009 (for slit width measurement in June)	Signature: via e-mail 23/12/2008 (for test in March) via e-mail 16/04/2009 (for slit width measurement in June)
Implementation by SOST: A sequence of 4 test orbits is scheduled on March 20th, 2009 (orbit 36873-36876). The date has been slightly shifted compared to our original proposal to fit other planning constraints. State parameter and timeline definitions – adjusted for March 20th, are implemented as described in the annexes. The final slit width measurements are scheduled for June 25th (orbit 38261-38266). In order to achieve a time separation between a solar event and Venus at 100 km similar to the test measurements, the Sun at an elevation of 22.5 deg has been selected as a reference. In the first 3 orbits start of the Venus timelines is exactly as derived from the ENVISAT reference orbit. In the next 2 orbits the Venus t/l begins 1 sec earlier and in the last orbit 1 sec later. This accounts for potential timing/pointing uncertainties as observed in the test measurements. In total 5 CTI parameter tables are uploaded. Timelines use IDs 03, 04, 05, 06, 07, 08 (all for Venus) and 31, 32 (shortened limb/nadir sequences between end of Venus t/l and start of eclipse) from test set 09. No interference occurs with OCR_40 (Cabauw campaign).		
SOST: M. Gottwald, E. Krieg, DLR-IMF	Date: 28/01/09 (test) 27/04/2009	Signature: via e-mail 28/01/09 Via e-mail 27/09/2009

Annex 1: Venus Visibility Analysis

As one of the two inner planets the celestial motion of Venus is limited to a region close to the Sun. Four distinct locations can be identified

- inferior conjunction: Venus stands in the direction of the Sun – closest approach to Earth
- maximum western elongation: Venus is furthest away from the Sun to the right – 'Morning Star'
- superior conjunction: Venus stands in the direction of the Sun – furthest away from Earth
- maximum eastern elongation: Venus is furthest away from the Sun to the left – 'Evening Star'

Fig. 1 displays the azimuth and elevation difference Sun-Venus ' for the periods in 2008 and 2009 when Venus is within the limb TCFoV (azimuth = 316° - 44°, elevation = -27.3°-19.5°). The difference is determined when Venus has reached an elevation which corresponds to an altitude of approx. 150 km. In 2008 Venus moves to the left edge of the limb TCFoV and leaves the TCFoV at day 220 (August 8th). On day 162 (June 10th) superior conjunction occurred (Venus behind Sun). Between day 220 (2008) and day 72 (March 17th, 2009) Venus is not visible in SCIAMACHY's limb TCFoV. On day 72 (2009) it enters the TCFoV again at the left edge and approaches the Sun for inferior conjunction on day 85 (March 26th). For the rest of the year Venus is visible in the limb TCFoV.

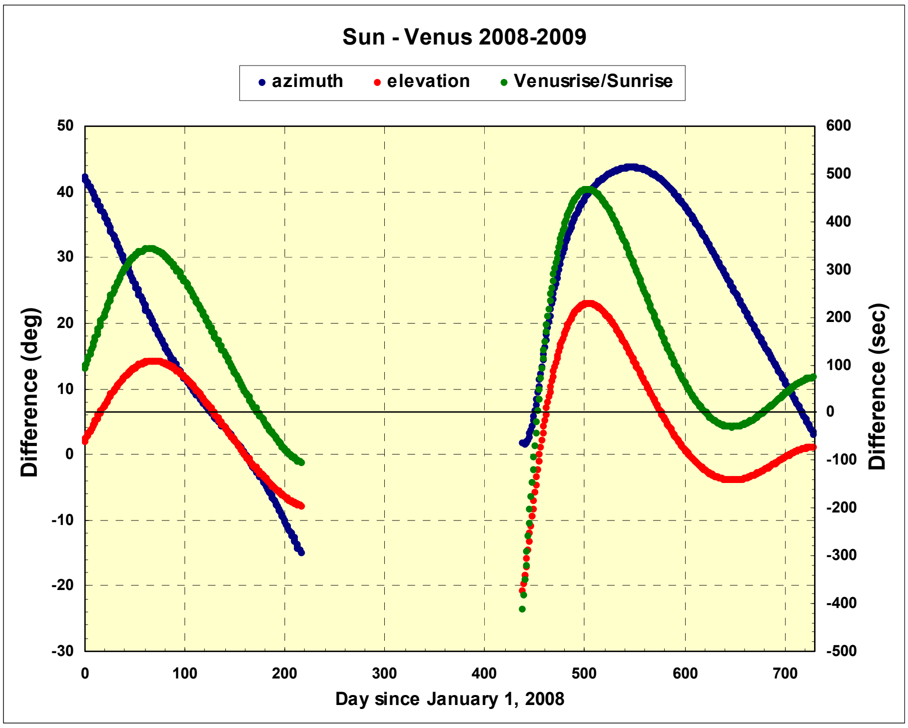

Fig. 1: Venus visibility in the limb TCFoV for the years 2008 and 2009.

The green curve in fig. 1 (secondary axis) shows the time difference between the Sun at an altitude of 17 km and Venus at 150 km. Positive values represent periods when the Sun rises before Venus, negative values those where Venus precedes the Sun. Since Venus moves with an elevation rate through the limb TCFoV, which is similar to the solar rate, the green curve permits an estimate when measurements between 150 km and the upper edge of the limb TCFoV are possible with the Sun still being either below the horizon or having already left the limb TCFoV. Periods where the Sun is trailing Venus would be preferred because they allow to execute the measurements prior to the SO&C observations. Thus none of the long timelines scheduled for the illuminated part of the orbit would require modification.

The second half of 2008 was not suited for Venus observations because the planet was either too close to the Sun or did not rise in the limb TCFoV. Measurements are possible in 2009 starting mid March.

The angular diameter and apparent brightness of Venus are depicted in fig. 2.

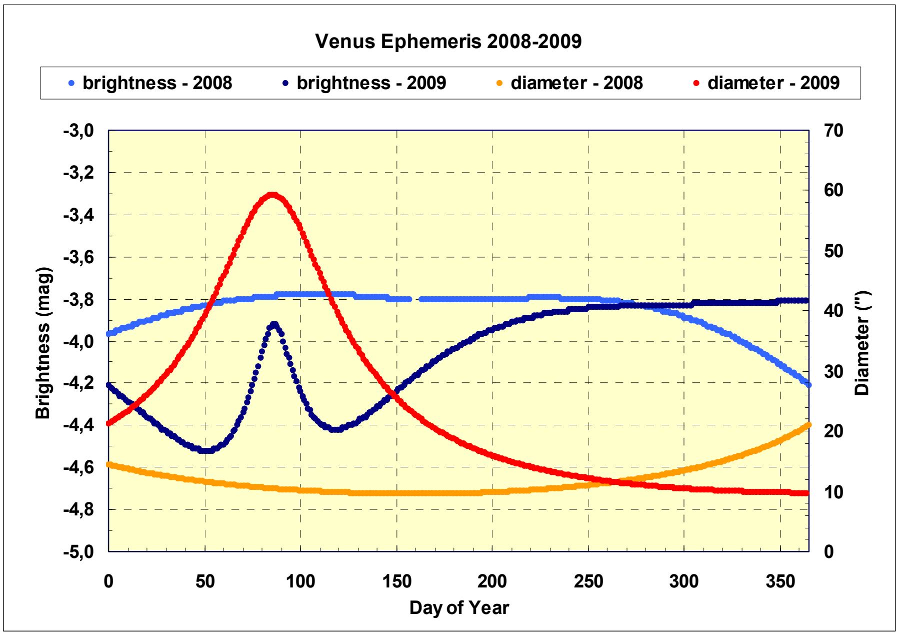

Fig. 2: Apparent brightness and diameter of Venus for the years 2008 and 2009.

Even at inferior conjunction the diameter of Venus (59”) is still smaller than the vertical extent of the IFoV (0.045° = 162”). For S/N issues Venus observations around times when the planet appears brightest would be favourable.

Annex 2: Venus Scans

Scan Strategy – General:

Scans in the Venus slit width observations differ from the proposed first test run.

Venus slit width measurements: The scan over Venus consists of two symmetric phases. In the first part the IFoV is positioned slightly above Venus and moved upwards with a rate smaller than Venus' elevation rate. Thus Venus overtakes the IFoV which is equivalent to a downward scan. The first phase ends when Venus is slightly above the IFoV. Then phase 2 begins by moving the IFoV with a faster rate upwards. Now the IFoV overtakes Venus which is equivalent to an upward scan.

Effective total exposure times and angular resolution are defined by the difference in elevation rates and the selected PET. Taking the total available time for Venus observations per orbit into account (100 sec), each scan takes 50 sec. If the vertical resolution has to amount to 0.001°-0.002°, the differential elevation rate between IFoV and Venus has to lie in the same range for a PET of 1 sec. Simulation of the scans yield that an elevation difference between Venus and IFoV at the start/end of 0.02° and a differential elevation rate of 0.0017°/sec fulfils the requirements.

No particular constraints exist for the azimuth of Venus and the IFoV. The azimuth of Venus changes by 1°/day, i.e. 0.07°/orbit. Therefore Venus does not approach the horizontal edges of the IFoV (1.8° wide) in 4 consecutive orbits when azimuthally centred in the first measurement.

Assuming no diffraction effects Venus can be observed, at least partially, from about 8 sec to 45 sec after the start of the measurement, i.e. for a total period of slightly more than 35 sec.

Venus test measurements: Since the pointing accuracy of the scan described above lies in the order of a few 10 mdeg, it has to be investigated first how well the complete planning chain (SOST simulation with definition of scanner pointing parameters and timelines – actual scheduling on ENVISAT side) together with the final on-board execution fulfils this requirement. For this purpose a single scan with variable margin (0.04°, 0.08°, 0.12° and 0.16 °) and adjusted differential elevation rates between Venus and IFoV (0.00125°/sec, 0.00205°/sec, 0.00285°/sec, 0.00365°/sec) shall be executed. It is identical to the first part of the scan for the actual Venus measurement except that the values for margin and differential elevation rate allow total scan duration of 100 sec in one direction. In 4 consecutive orbits a wider range in elevation can be covered permitting to investigate the accuracy of IFoV pointing w.r.t. Venus. From the observed Venus signal and corresponding ESM scanner readings we hope to conclude whether corrections are necessary for the basic profile parameters of the actual Venus scans.

Options for Scan Part 2:

The quasi upward scan can be implemented in two ways.
Version A: Another basic profile, unused in the particular orbit, defines a counter elevation rate required to produce the upward scan resulting in a differential vertical rate as in the quasi downward scan (part 1). We propose to use basic profile 13. This profile is nominally available for modification in the time slot envisaged.
Version B: A relative profile unused in the particular orbit, defines a counter elevation rate required to produce the upward scan resulting in a differential vertical rate as in the quasi downward scan (part 1). We propose to use relative profile 5. Duration of this profile is 2 sec such that 24 repetitions are required to result in an opposite scan of 50 sec duration. To maintain the information of the position of Venus at the end of part 1 a further basic profile (ID13) has to be used containing exactly this elevation position. No elevation rate is required.

Since the basic profile contains also the azimuth information this position is further progressed.

Venus Parameters:

The scans options (test scan and symmetric scan) shall ensure useful results

- at the proposed dates (March 20th, 2009 = DoY 79 and June 25th, 2009 =DoY 175)
- an angular resolution of the slit dimension between 0.001°-0.002°

At these dates the Line-of-Sight parameters and ephemeris data of Venus at the start of the observations are as listed in table 1. For comparison the solar parameters are given for the same moment. Note that we have used here a Venus altitude of 100 km instead of 150 km (visibility analysis) since simulation of the scan options revealed that a measurement duration of more than 75 sec is required. LoS parameters have been derived using the ENVISAT CFIs with a time resolution of 0.1 sec corresponding to a Venus altitude resolution of 0.3 km.

	Venus (DoY 79 – orbit 36873-36876)	**Sun (DoY 79 – orbit 36873-36876)**
azimuth (°)	322.693/322.795/322.897/323.000	323.252/323.315/323.378/323.441
azimuth rate (°/sec)	0.0160/0.0160/0.0159/0.0159	0.0253/0.0252/0.0251/0.0249
elevation (°)	25.305/25.305/25.306/25.305	36.155/36.067/35.979/35.891
elevation rate (°/sec)	-0.0455/-0.0455/-0.0456/-0.0457	-0.0459/-0.0460/-0.0460/-0.0461
altitude (km)	100.1/100.0/100.0/99.9	< 500 km (below limb)
diameter	58.7” (< 40% vertical IFoV)	
brightness	-4.02 mag	
	Venus (DoY 175 – orbit 38261-38266)	**Sun (DoY 175 – orbit 38261-38266)**
azimuth (°)	22.069/22.066/22.065/22.062/22.06/22.058	338.431/338.426/338.422/338.418/338.414/338.410
azimuth rate (°/sec)	-0.0126/-0.0126/-0.0126/-0.0126/-0.0126/-0.0126	0.0005/0.0005/0.0005/0.0005/0.0005/0.0005
elevation (°)	25.370/25.371/25.370/25.371/25.370/25.369	8.479/8.495/8.517/8.534/8.556/8.573
elevation rate (°/sec)	-0.0563/-0.0563/-0.0563/-0.0563/-0.0563/-0.0563	-0.0545/-0.0545/-0.0545/-0.0545/-0.0545/0.0545
altitude (km)	100.0/100.1/99.9/100.1/99.9/100.0	> 400
diameter	19.5” (< 12% vertical IFoV)	
brightness	-4.07 mag	

Table 1: Venus and Sun parameters at proposed observation dates

The measurement duration is given by the time it takes Venus to rise from 100 km to the upper edge of the limb TCFoV, i.e. to cover an elevation width of 5.9° with a rate as given above. The resulting duration amounts to 102 sec on all three dates.

Scanner State Simulation:

The scan (part 1 / part 2 – version B) was simulated yielding results for the scanner behaviour compliant with what was expected. Below the planned execution is shown for the Venus slit width measurements on day 175 with the final settings for the scan based on the actual data of Venus (table 1). Only results from the elevation scanner are displayed. The ASM control is considered uncritical. Note that in addition to the derived ESM scan track also the relative position of the IFoV and in comparison the size of Venus are indicated.

Fig. 1-3 present simulation results for day 175.

In these new simulations the limitations of Excel have been overcome and the output of the scanner simulator tool is produced and displayed for the full state duration including set-up and close-up. Part 1 and 2 of the scan is set to 50 sec duration each. The graphs prove the envisaged observation strategy, i.e. the overtaking of the IFoV by the rising Venus and show the turnaround of the relative position in part 2. All angular dimensions are the actual values of day 175. The vertical dimension of the IFoV is shown by the two black lines. It is drawn as specified with a width of 0.045°. The angular values in the graph are given in scanner angles, i.e. they are half of the LoS-angles. The graph covers the start of scan, entry of Venus into IFoV and crossing of Venus of the centre of the IFoV. (‘downwards scan’), exit of Venus from the IFoV and the turnaround. Since set-up is part of the simulation, the measurement part (phase 2 in scanner state table) starts at 1300 msec.

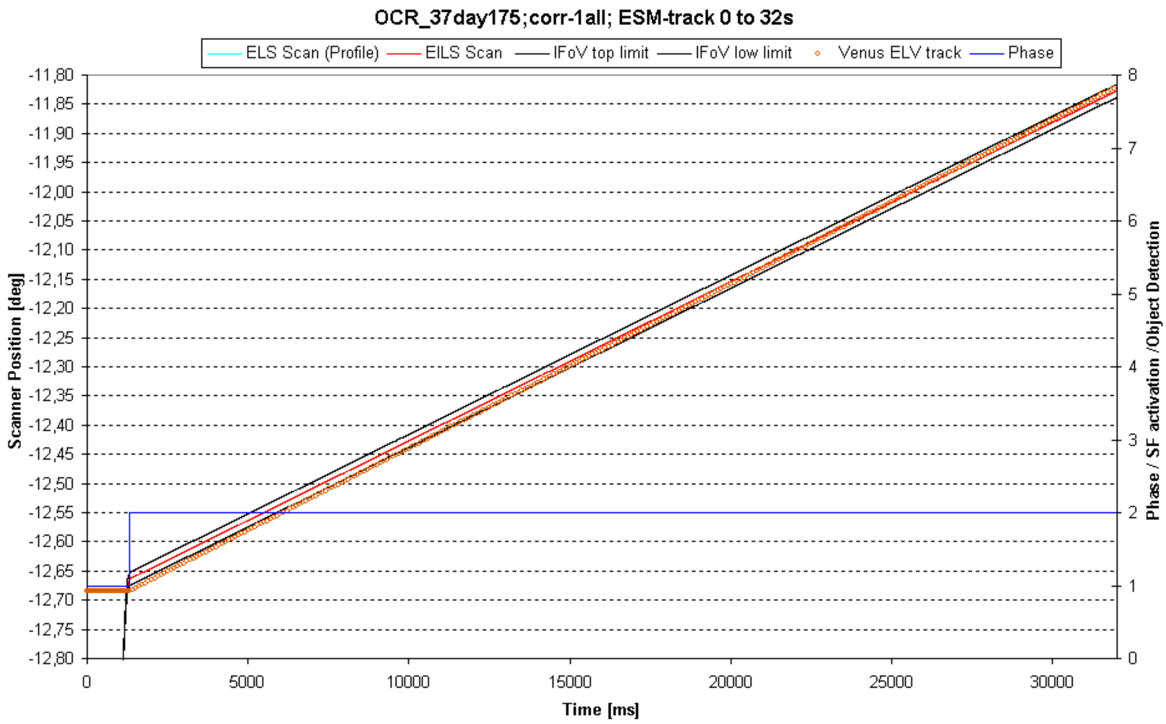

Fig. 1: The first 30 sec of part 1 of a full state simulation.

A zoomed-in version for the initial part of fig. 1 is given in fig. 2. It illustrates how Venus is catching up on the IFoV and then entering it.

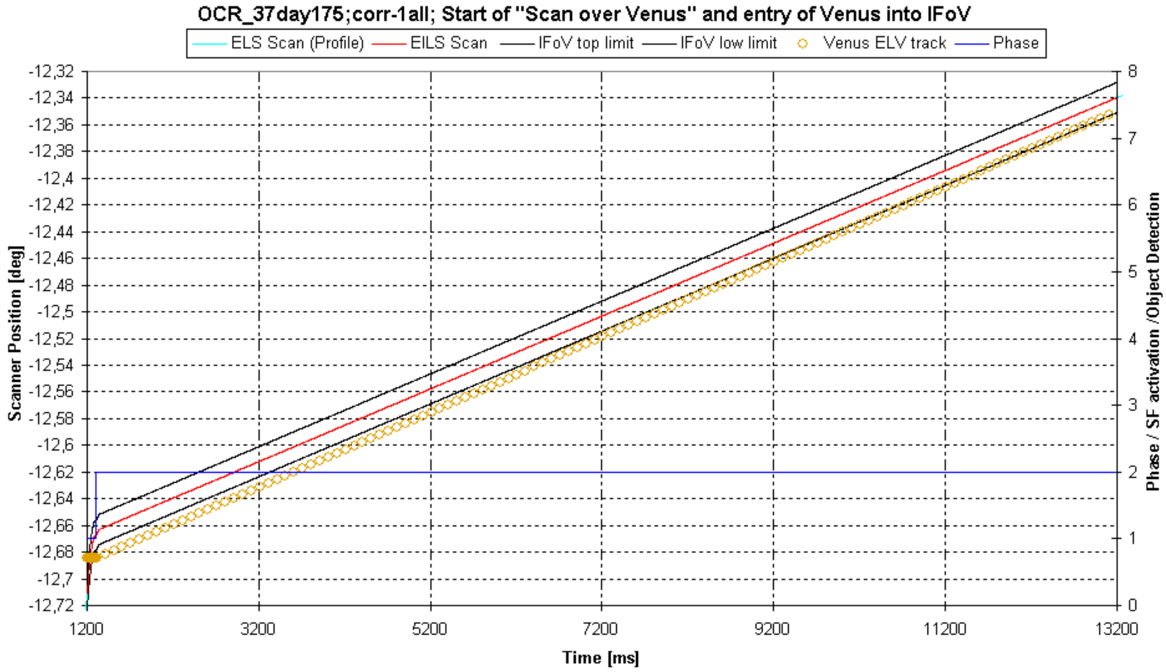

Fig. 2: First 12 sec of the scan from the simulation described above. In this period the entry of the upper edge of Venus into the IFoV at about 8 sec (8200) of the scanner operation is obvious.

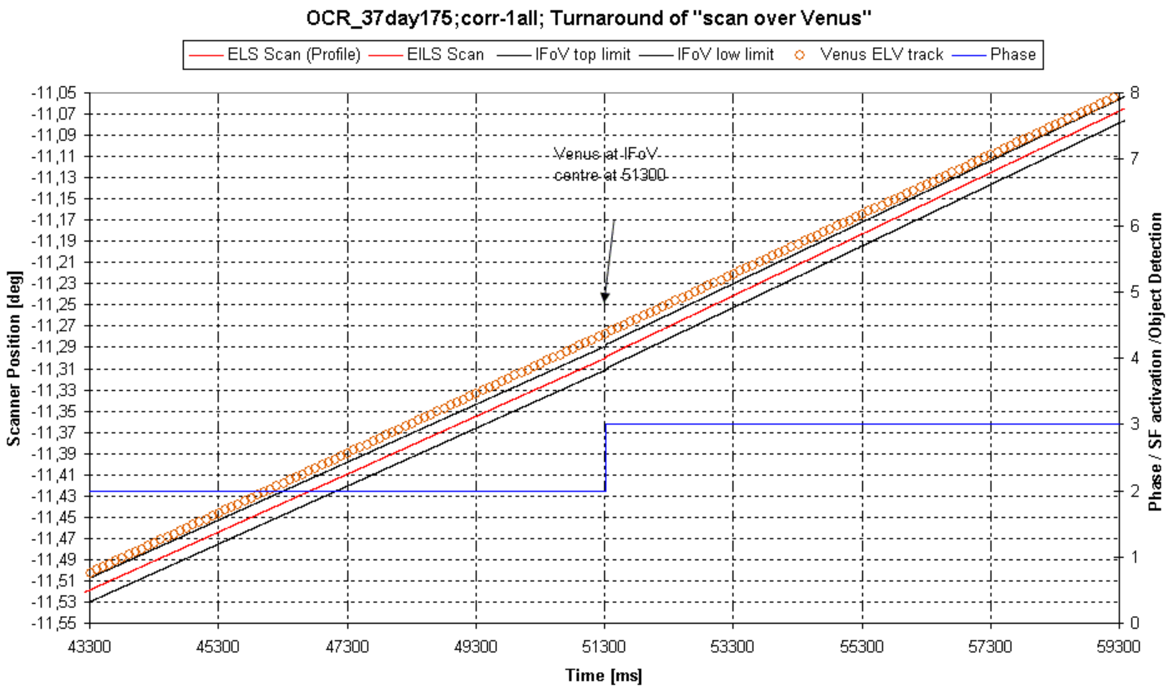

Fig. 3: The middle 12 sec of the same simulation with turnaround of the scanner motion and the re-entry of the lower edge of Venus into the IFoV.

Annex 3: Detailed State Design

For the Venus test measurement the following CTI parameter settings apply.

Scanner State parameter table:

Scanner State Parameter #24	24	Venus-observation - OCR-37							
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	24								
spare									
Relative Scan Profile 1 Factor	0								
Relative Scan Profile 2 Factor	0								
Relative Scan Profile 3 Factor	0								
Relative Scan Profile 4 Factor	0								
Relative Scan Profile 5 Factor	0								
Relative Scan Profile 6 Factor	0								
Number of Scan Phases	3								
Duration of Phase [msec]		1300	100000	840	0	0	0	0	0
Phase Type		0	1	0	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
H/W constellation		3	3	3	0	0	0	0	0
Azimuth Basic Scan Profile Identifier		4	4	0	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	49	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		11	11	0	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	49	0	0	0	0	0	0

State Index table:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Venus_observation OCR37	24	1	6	6	28

State Duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
Venus_observation OCR37	24	255	STANDARD	1600	25576	26512	174

PET table:

State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
24	Low	1,	1,	1,	1,	1,	1,	1,	1,	1,	1,	24	High	1,	1,	1,	1,	1,	1,	1,	1,	1,	1,	changed due to =OCR_37 Venus

Basic Profile table:

In routine measurement operations the basic profiles 04, 10, 11 and 13 are used in Sun_ASM_Diffuser_Calibration states (ID 17-22). Since the orbits reserved for OCR_37 do not execute daily calibrations, all 4 profiles can be temporally overwritten. During the Venus test measurements on day 79 (orbits 36873-36876) only one profile each for ASM and ESM are used since no inverted relative motion of Venus has to be generated. The following values for the basic profiles apply:

Orbit 36873: LoS margin = 0.040°, elevation rate = -0.00125 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000140	000000	-0000459833	986111
11	-008145	000386	0003228859	-220282

Orbit 36874: LoS margin = 0.080°, elevation rate = -0.00205 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000140	000000	-0000460723	986111
11	-008145	000379	0003228859	-219933

Orbit 36875: LoS margin = 0.120°, elevation rate = -0.00285 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000139	000000	-0000461613	986111
11	-008145	000373	0003228859	-219593

Orbit 36876: LoS margin = 0.160°, elevation rate = -0.00365 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000139	000000	-0000462512	986111
11	-008145	000367	0003228859	-219235

For the Venus slit width measurements on day 175 (orbits 38261-38266) the CTI parameter settings for

- State Index
- Measurement duration
- Pixel exposure time

are identical to those from the Venus test measurements from day 79.

However the Scanner State and Basic Profile table differ since Venus shall cross the IFoV twice. Thus an inverted relative motion of Venus has to be produced. This requires to split phase 2 of the Scanner State parameter table into 2 phases of 50 sec each and to involve now two basic profiles each for the ASM and the ESM with the values listed below. They can be maintained for all 4 orbits because the elevation margin of Venus relative to the IFoV is kept at 0.02° and the elevation position of Venus varies only by ± 0.0025°.

Scanner State parameter table:

Scanner State Parameter #24	24	Venus-observation - OCR-37							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	24								
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	4								
Duration of Phase [msec]		1300	50000	50000	840	0	0	0	0
Phase Type		0	1	1	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		1	1	1	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		6	6	6	0	0	0	0	0
H/W constellation		3	3	3	3	0	0	0	0
Azimuth Basic Scan Profile Identifier		4	4	10	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	24	24	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		1	1	1	0	0	0	0	0
Elevation Relative Scan Profile Identifier		6	6	6	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		11	11	13	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	24	24	0	0	0	0	0

Basic Profile table:

LoS margin = 0.020°, elevation rate = -0.0017 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	000110	000000	-977934	986111
10	000110	000000	-972436	170480
11	-008145	000476	3228859	-221024
13	-008145	000506	3159046	-197200

Venus observation (ID 24) timing inputs for timeline generation (test measurements)

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	277 (762-636-23+174)
total RTCS-duration	762 cts
WME	25576 cts (100×16×16-24)
WSR	174 cts
state duration	26512 cts (762+25576+174)

set-up	636 cts
cleanup	275 cts
measurement	25600 cts (100×16×16)
total duration	26512 cts
SDPU duration	1600 bcps

phase 1	1300 msec
phase 2	100000 msec
phase 3	840 msec

Venus observation (ID 24) timing inputs for timeline generation (slit width measurements)

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	277 (762-636-23+174)
total RTCS-duration	762 cts
WME	25576 cts (100×16×16-24)
WSR	174 cts
state duration	26512 cts (762+25576+174)

set-up	636 cts
cleanup	275 cts
measurement	25600 cts (100×16×16)
total duration	26512 cts
SDPU duration	1600 bcps

phase 1	1300 msec
phase 2	50000 msec
phase 3	50000 msec
phase 4	840 msec

OCR_38: Full Limb Mode Orbits for Assessing the Horizontal Gradient Effects on Profile Retrieval

SCIAMACHY	**Operation Change Request**	OCR No: 38 Issue:
Title: Full Limb Mode Orbits for Assessing the Horizontal Gradient Effects on Profile Retrieval		

Description of Request:

To perform a limited number of selected orbits with limb scanning sequences only, (i.e. to replace nadir measurements in between with limb states) in order to increase the horizontal resolution of the limb profiles in flight direction.
This allows more correct profile retrievals by accounting for the horizontal gradient effect, i.e. a tomographic retrieval approach can be performed for all latitudes (see Puķīte et al., 2008* where it is studied for the Arctic winter).

(1) Of particular interest is to have this “limb-only” mode for few orbits per every month (every second month) in order to estimate this effect for different seasons, since the considered trace gases (O3, NO2, BrO, OClO) vary considerably both in latitude and with season. These orbits can be in one day depending on technical possibilities.
(2) Besides that, we would ask for “limb-only” orbits during Antarctic polar winter two times (first time: 15 to 25 August, second time 5 to 15 September) for a complete day (in order to assure that for some orbits the measurements will cross the polar vortex boundary where especially strong gradients occur).

Common limb retrieval algorithms assume a horizontally homogeneous atmosphere for the retrieval constraint, i.e. the existing strong horizontal gradients of photo chemically active species are neglected. This can lead to remarkable over- or underestimation of the retrieved profiles.
An option to account for it is to apply a tomographic approach where radiative transfer modelling is performed by applying an atmosphere that is discretized not only in altitude but also in latitude. It takes into account horizontal gradients using the measurement data from subsequent limb states. This approach is possible when limb states are close enough (i.e. they overlap to some extent) as it was shown in Puķīte et al., (2008) for the northern limb states where no nadir measurements are made in between. By increasing the horizontal resolution of the limb observations in flight direction (i.e. replacing nadir with limb observations for selected orbits) this approach could be applied globally.

With this study it is possible to asses the effect of horizontal gradients for the whole orbit for different seasons. The profiles retrieved from the tomographic approach let us then estimate if a 2D retrieval is also possible for the usual SCIAMACHY limb/nadir alternating measurement (e.g. by an interpolation method). This would significantly improve the accuracy of the profiles retrieved from SCIAMACHY limb observations.

* Puķīte et al., Atmos. Chem. Phys., 8, 3045-3060, 2008

Originator: Jānis Puķīte	Date of Issue: 7.8.2008	Signature: e-mail, J. Puķīte, 7.8.2008

Assessment of SSAG (necessary for requests by scientists): The tomographic retrieval approach of Jānis Puķīte (MPI Chem, Mainz) is very innovative and may help to retrieve more accurate stratospheric profiles under horizontally heterogeneous stratospheric conditions (vortex etc.). The methods was demonstrated already for high northern latitudes. Before going for a few limb-only days per month on a regular basis, the improvements in limb profiling on a global scale should be demonstrated. It is therefore recommended to investigate and implement first a few limb only orbits to gather relevant test data for a global tomographic retrieval study.		
SSAG: H. Bovensmann, IFE	Date: 16/09/2008	Signature: via e-mail 16/09/2008
Classification of OCR:		
OCR Analysis (incl. Implementation Option): This OCR requires to modify timelines only. The duration of a limb state (55.87 sec) is shorter than that of a nadir state (68.56 sec). Therefore the total number of limb states in a single timeline (N = 63) does not fully cover the illuminated part of the orbit. 63 limb states cover 3519.81 sec while the time span between end of the SO&C window and start of the eclipse phase varies between 3900 sec and 4020 sec. In order not to introduce a data gap of several minutes length we propose to generate two test timelines (set 09, ID 47 and 50). The first with a duration of 3468 sec is complemented by the second with a duration of 451 sec. Both timelines shall be scheduled for test purposes in 7 consecutive orbits around December 10, 2008. This date has been chosen to avoid conflicts with OCR_36 which also uses test timelines 47 and 50 (different sub IDs) and is expected to be planned for another test run end of November.		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 17/09/2008	Signature: via E-Mail 17/09/2008
Approval of Proposed Implementation:		
Originator Approval: Jānis Puķīte, MPCH	Date: 29/09/2008	Signature: via e-mail 29/09/2008
SSAG Approval: H. Bovensmann, IFE	Date: 29/09/2008	Signature: via e-mail 29/09/2008
Decision / Approval: Implementation shall be done for testing during 7 consecutive limb only orbits.		
DLR Approval: A. Friker (if necessary NIVR, SPEC)	Date: 31/10/2008	Signature: via e-mail 31/10/2008
Implementation by SOST: The 7 *limb only* test orbits are scheduled on December 14, 2008 between orbits 35499 and 35505 (note: around the proposed date on December 10 lunar occultation measurements are planned such that *limb only* timelines cannot be implemented). The *limb only* portion of the illuminated part of the orbit are covered by two test timelines 47 and 50 (timeline set 09). They execute in total 70 limb states each orbit.		
SOST: M. Gottwald, DLR-IMF	Date: 31/10/2008	Signature: via e-mail 31/10/2008

Annex: Test Timelines for OCR_38

H:\scia\timing\timeline_set_09\tl_09_47_07.xls	SOC_end_ecl_beg_limb_only_part_1		Table start ID =	2945		Event_type =	n/a
DURATION <s>=	3467,87109375	DTX0 <s>=	n/a	DTX1 <s>=	n/a	DTX2 <s>=	n/a
SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000

State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	29	limb02	709	2,77	2,77	55,87	58,64
2	29	limb02	14303	55,87	58,64	55,87	114,51
3	29	limb02	14303	55,87	114,51	55,87	170,38
4	29	limb02	14303	55,87	170,38	55,87	226,25
5	30	limb03	14303	55,87	226,25	55,87	282,13
6	30	limb03	14303	55,87	282,13	55,87	338,00
7	30	limb03	14303	55,87	338,00	55,87	393,87
8	30	limb03	14303	55,87	393,87	55,87	449,74
9	30	limb03	14303	55,87	449,74	55,87	505,61
10	30	limb03	14303	55,87	505,61	55,87	561,48
11	31	limb04	14303	55,87	561,48	55,87	617,35
12	31	limb04	14303	55,87	617,35	55,87	673,22
13	31	limb04	14303	55,87	673,22	55,87	729,09
14	32	limb05	14303	55,87	729,09	55,87	784,96
15	32	limb05	14303	55,87	784,96	55,87	840,84
16	32	limb05	14303	55,87	840,84	55,87	896,71
17	32	limb05	14303	55,87	896,71	55,87	952,58
18	32	limb05	14303	55,87	952,58	55,87	1008,45
19	32	limb05	14303	55,87	1008,45	55,87	1064,32
20	32	limb05	14303	55,87	1064,32	55,87	1120,19
21	32	limb05	14303	55,87	1120,19	55,87	1176,06
22	32	limb05	14303	55,87	1176,06	55,87	1231,93
23	32	limb05	14303	55,87	1231,93	55,87	1287,80
24	32	limb05	14303	55,87	1287,80	55,87	1343,68
25	32	limb05	14303	55,87	1343,68	55,87	1399,55
26	32	limb05	14303	55,87	1399,55	55,87	1455,42
27	32	limb05	14303	55,87	1455,42	55,87	1511,29
28	32	limb05	14303	55,87	1511,29	55,87	1567,16
29	32	limb05	14303	55,87	1567,16	55,87	1623,03
30	32	limb05	14303	55,87	1623,03	55,87	1678,90
31	32	limb05	14303	55,87	1678,90	55,87	1734,77
32	32	limb05	14303	55,87	1734,77	55,87	1790,64
33	32	limb05	14303	55,87	1790,64	55,87	1846,52
34	32	limb05	14303	55,87	1846,52	55,87	1902,39
35	32	limb05	14303	55,87	1902,39	55,87	1958,26
36	32	limb05	14303	55,87	1958,26	55,87	2014,13
37	32	limb05	14303	55,87	2014,13	55,87	2070,00
38	32	limb05	14303	55,87	2070,00	55,87	2125,87
39	32	limb05	14303	55,87	2125,87	55,87	2181,74
40	32	limb05	14303	55,87	2181,74	55,87	2237,61
41	32	limb05	14303	55,87	2237,61	55,87	2293,48
42	31	limb04	14303	55,87	2293,48	55,87	2349,36
43	31	limb04	14303	55,87	2349,36	55,87	2405,23
44	31	limb04	14303	55,87	2405,23	55,87	2461,10
45	31	limb04	14303	55,87	2461,10	55,87	2516,97
46	30	limb03	14303	55,87	2516,97	55,87	2572,84
47	30	limb03	14303	55,87	2572,84	55,87	2628,71
48	30	limb03	14303	55,87	2628,71	55,87	2684,58
49	33	limb06	14303	55,87	2684,58	55,87	2740,45
50	33	limb06	14303	55,87	2740,45	55,87	2796,32
51	33	limb06	14303	55,87	2796,32	55,87	2852,20
52	33	limb06	14303	55,87	2852,20	55,87	2908,07
53	33	limb06	14303	55,87	2908,07	55,87	2963,94
54	33	limb06	14303	55,87	2963,94	55,87	3019,81
55	33	limb06	14303	55,87	3019,81	55,87	3075,68
56	33	limb06	14303	55,87	3075,68	55,87	3131,55
57	33	limb06	14303	55,87	3131,55	55,87	3187,42
58	33	limb06	14303	55,87	3187,42	55,87	3243,29
59	33	limb06	14303	55,87	3243,29	55,87	3299,16
60	33	limb06	14303	55,87	3299,16	55,87	3355,04
61	33	limb06	14303	55,87	3355,04	55,87	3410,91
62	33	limb06	14303	55,87	3410,91	55,87	3466,78
63	End of Timeline	End of Timeline	14303	55,87			
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	887495		3466,78	0,09	3466,87

Table 1: Timeline 47 (t/l set 09, sub_ID 07)

H:\scia\timing\timeline_set_09\tl_09_50_06.xls		SOC_end_ecl_beg_limb_only_part_2		Table start ID =	3137	Event_type =	n/a
DURATION <s>=	450,83203125	DTX0 <s>=	n/a	DTX1 <s>=	n/a	DTX2 <s>=	n/a
SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, sec)	State TT (relative, ct)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	33	limb06	709	2,77	2,77	55,87	58,64
2	33	limb06	14303	55,87	58,64	55,87	114,51
3	33	limb06	14303	55,87	114,51	55,87	170,38
4	33	limb06	14303	55,87	170,38	55,87	226,25
5	33	limb06	14303	55,87	226,25	55,87	282,13
6	33	limb06	14303	55,87	282,13	55,87	338,00
7	33	limb06	14303	55,87	338,00	55,87	393,87
8	33	limb06	14303	55,87	393,87	55,87	449,74
9	End of Timeline	End of Timeline	14303	55,87			
10	End of Timeline	End of Timeline	0				
11	End of Timeline	End of Timeline	0				
12	End of Timeline	End of Timeline	0				
13	End of Timeline	End of Timeline	0				
14	End of Timeline	End of Timeline	0				
15	End of Timeline	End of Timeline	0				
16	End of Timeline	End of Timeline	0				
17	End of Timeline	End of Timeline	0				
18	End of Timeline	End of Timeline	0				
19	End of Timeline	End of Timeline	0				
20	End of Timeline	End of Timeline	0				
21	End of Timeline	End of Timeline	0				
22	End of Timeline	End of Timeline	0				
23	End of Timeline	End of Timeline	0				
24	End of Timeline	End of Timeline	0				
25	End of Timeline	End of Timeline	0				
26	End of Timeline	End of Timeline	0				
27	End of Timeline	End of Timeline	0				
28	End of Timeline	End of Timeline	0				
29	End of Timeline	End of Timeline	0				
30	End of Timeline	End of Timeline	0				
31	End of Timeline	End of Timeline	0				
32	End of Timeline	End of Timeline	0				
33	End of Timeline	End of Timeline	0				
34	End of Timeline	End of Timeline	0				
35	End of Timeline	End of Timeline	0				
36	End of Timeline	End of Timeline	0				
37	End of Timeline	End of Timeline	0				
38	End of Timeline	End of Timeline	0				
39	End of Timeline	End of Timeline	0				
40	End of Timeline	End of Timeline	0				
41	End of Timeline	End of Timeline	0				
42	End of Timeline	End of Timeline	0				
43	End of Timeline	End of Timeline	0				
44	End of Timeline	End of Timeline	0				
45	End of Timeline	End of Timeline	0				
46	End of Timeline	End of Timeline	0				
47	End of Timeline	End of Timeline	0				
48	End of Timeline	End of Timeline	0				
49	End of Timeline	End of Timeline	0				
50	End of Timeline	End of Timeline	0				
51	End of Timeline	End of Timeline	0				
52	End of Timeline	End of Timeline	0				
53	End of Timeline	End of Timeline	0				
54	End of Timeline	End of Timeline	0				
55	End of Timeline	End of Timeline	0				
56	End of Timeline	End of Timeline	0				
57	End of Timeline	End of Timeline	0				
58	End of Timeline	End of Timeline	0				
59	End of Timeline	End of Timeline	0				
60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	115133		449,74	0,09	449,83

Table 2: Timeline 50 (t/l set 09, sub_ID 06)

OCR_39: Changing Integration Time for Cluster 16 an 18 (Channel 3) for 5 November 2008 to 2 December 2008 to 0.25 or Shorter for Nadir – Same Changes as in OCR_32 and OCR_35

<table>
<tr><td>SCIAMACHY</td><td rowspan="2">Operation Change Request</td><td>OCR No: 39</td></tr>
<tr><td></td><td>Issue: A</td></tr>
<tr><td colspan="3">Title: Changing Integration Time for Cluster 16 an 18 (Channel 3) for 5 November 2008 to 2 December 2008 to 0.25 or Shorter for Nadir – Same Changes as in OCR_32 and OCR_35</td></tr>
<tr><td colspan="3"><u>Description of Request:</u>

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32 last year. First results show from analysing SCIA data from Nov 2007 and indicate that the former operation change OCR_32 (and also OCR_35) was successful (see Figure 1 attached): we can with using the entire data set from ~530 to 595 nm for DOAS analysis resolve the absorption of the phycoerythrin-containing Synechococcus (a dominating phytoplankton species in tropical areas) and distinguish the global abundance of this species with a much better coverage and higher spatial resolution. With resolving Synechococcus distributions from SCIAMACHY data, this enables to distinguish this species from other cyanobacteria species and helps to improve phytoplankton biomass estimates and marine nutrient flux studies.

In normal operation the integration time in clusters 16 and 18 is around 1 not enough to get highly spatially resolved results for further phytoplankton modelling approaches. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups. We choose the time of Nov 5 to Dec, 2 2008, because then we are measuring online in the Atlantic Ocean between 20°N and 25°S in situ phytoplankton characteristics during a ship cruise (on Research Vessel Polarstern, Ant XXV-1) which are necessary data for validation of these specific phytoplankton retrieval. It is sufficient to fullfil the above requirements only for solar zenith angles smaller 60°.</td></tr>
<tr><td>Originator Astrid Bracher</td><td>Date of Issue: 2008-09-16</td><td>Signature:A. Bracher by email 2008-09-16</td></tr>
<tr><td colspan="3"><u>Assessment of SSAG (necessary for requests by scientists):</u>

The execution of OCR39 for the time frame 5.11. - 2.12.2008 is recommended as it improves Chlorophyl retrieval significantly and operational products are not affected.</td></tr>
<tr><td>SSAG: H. Bovensmann, IFE</td><td>Date: 16/09/2008</td><td>Signature: via e-mail 16/09/2008</td></tr>
<tr><td colspan="3">Classification of OCR: D</td></tr>
</table>

OCR Analysis (incl. Implementation Option):

The following analysis is identical to that of OCR_35 executed in April 2008. A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15,16,17 and 18.

The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters.
(Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30km x 60 km, 1 s to about 30km x 240 km.)

Increase integration times of "non-special" clusters in channel 7 (48,49,51,53) and blinded pixels in channel 6 (36,47) to 5s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above

Since the implementation involves CTI-tables only and no MPS-activities the proposed timeslot November 5, 2008 to December 2, 2008 can be met. We will upload the modified CTI parameter tables in orbit 34941 (November 05, 2008) and switch back to the final flight configuration in orbit 35341 (December 03, 2008).

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 17/09/2008	Signature: via E-mail 17/09/2008

Approval of Proposed Implementation:

Originator Approval: Astrid Bracher	Date: 28/10/2008	Signature: via e-mail, 28/10/2008
SSAG Approval: H. Bovensmann	Date: 01/10/2008	Signature: via e-mail, 01/10/2008

Decision / Approval:

It is recommended to implement this OCR in the same way as already successfully tested to work for OCR_32 and OCR_35. Data users need to be informed in advance on this temporary change of integration times (Action ESA).

DLR Approval: (if necessary NIVR, SPEC)	Date: 28/10/2008	Signature: via e-mail, 28/10/08

Implementation by SOST:

The coadding tables 26 and 27 will be modified as specified in tables N6 and N7 of annex 2.

Start orbit for the execution of OCR_39 is 34940 (November 05, 00:01 UTC), Stop orbit will be 35341 (December 03, about 00:23 UTC).

SOST: M. Gottwald, DLR-IMF	Date: 29/10/2008	Signature: via e-mail 29/10/2008

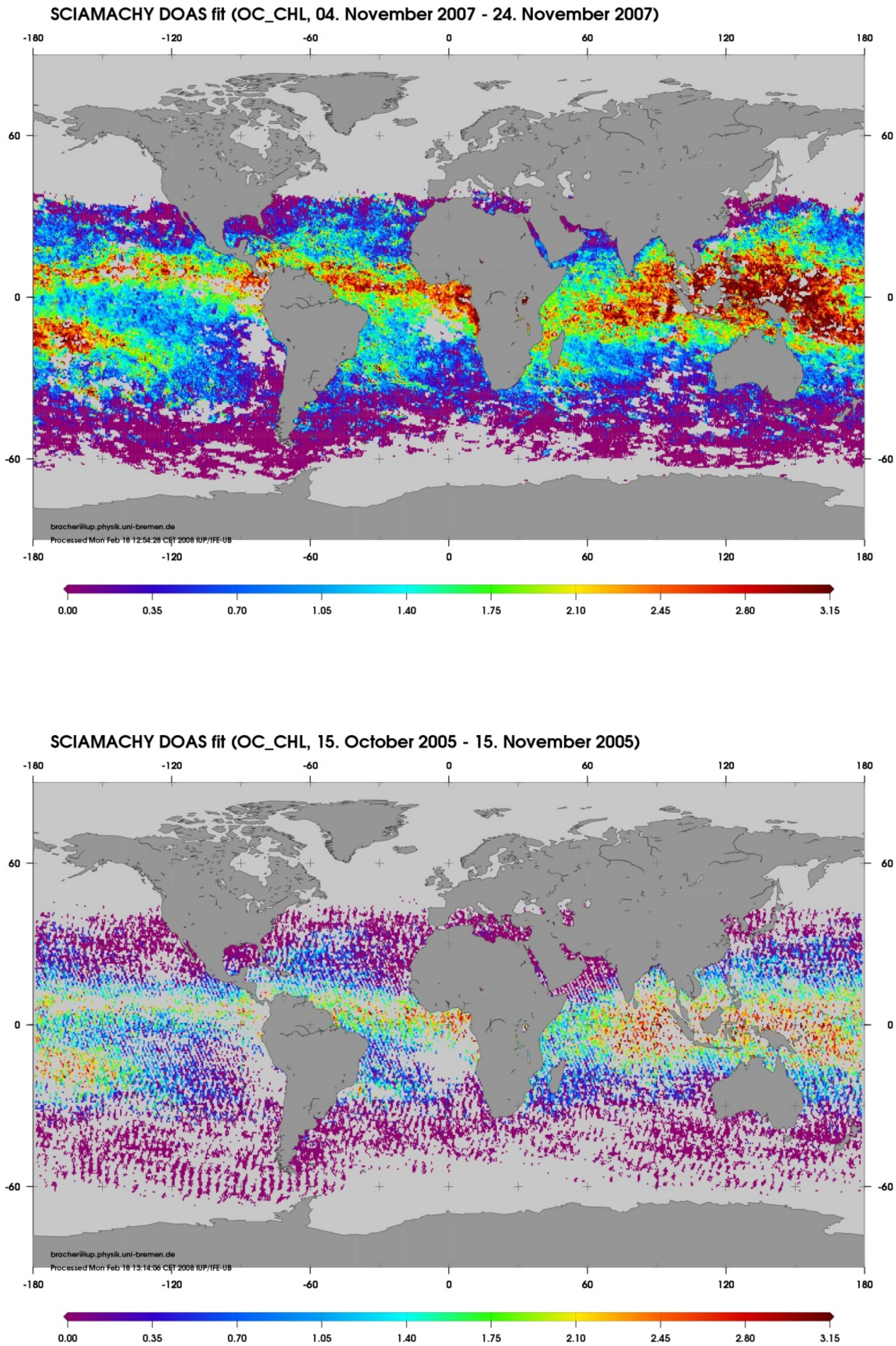

Figure 1: Mean of global distribution of absorption by phycoerythrin-containing cyanobacteria retrieved by DOAS from SCIAMACHY measurements at 530 to 595 nm. Upper panel: from 4 to 24 Nov 2007 (during OCR 32) with the same integration times at clusters 16 to 18. Lower panel: from 15 Oct to 14 Nov 2005 with varying integration times at clusters 16, 17, and 18

Annex 2:

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	2	0,25	0,5
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	4	0,125	0,5
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							386333

Summary of results N7

State							N7
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,125	0,25
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	40	0,125	5
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	40	0,125	5
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	10	0,5	5
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	10	0,5	5
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390784

The maximum data rate of 390000 bits/s is slightly exceeded. This is considered to be uncritical since nadir states with data rates up to 391034 bits/s have already been run successfully.

OCR_40: CEOS/GEOMON Campaign for NO2

SCIAMACHY	**Operation Change Request**	OCR No: 40 Issue:
Title: CEOS/GEOMON Campaign for NO2		
Description of Request: Between 8 June and 19 July to optimise the number of nadir pixels overlapping Cabauw (51.6N, 4.6E). If the narrow swath overlaps Cabauw, the request is to have a nadir state with narrow swath over Cabauw.		
Originator: Ankie Piters	Date of Issue: 20-1-2009	Signature: via e-mail 20-1-2009
Assessment of SSAG (necessary for requests by scientists): The CEOS/GEOMON campaign in Cabauw has a special focus to characterise the quality of tropospheric NO2 measurements. Many groups will measure trop. NO2 and related parameters on ground (MAX-DOAS, in-situ, LIDAR etc.) to evaluate in detail trop. NO2 from satellites (GOME-2, OMI, SCIAMACHY). This is therefore a very unique opportunity to assess the quality of trop. NO2 derived from SCIAMACHY and the proposed narrow swath observations will help to draw detailed conclusions. The OCR is therefore recommended for investigation and implementation.		
SSAG: H. Bovensmann	Date: 23.3.2009	Signature: e-mail, 23.3.2009
Classification of OCR:		
OCR Analysis (incl. Implementation Option): The implementation of this OCR requires two steps: • finetuning the execution of sequence 1/sequence 2 timelines such that a maximum number of nadir states over Cabauw is achieved (as for previous OCRs) • whenever Cabauw lies within a nadir small swath width (about ± 60 km across track), the nominal nadir wide swath state shall be replaced by the corresponding nadir small swath state. Between June 8^{th} and July 19^{th} the wide swath nadir states with indices 1 (ID1), 2 (ID2) in the ascending part of the orbit and 10 (ID6), 11 (ID6), 12 (ID7) in the descending part of the orbit could cover Cabauw. They would be replaced by small swath nadir states ID9, ID10, ID14 and ID15. These states shall become part of two new test timelines (sequence 1 and sequence 2) but only for those nadir indices coinciding with Cabauw. All other wide swath nadir states remain untouched. If Cabauw cannot be covered with a small swath nadir state, no nadir state exchange shall occur.		
SOST: M. Gottwald, DLR-IMF (ESA, Industry if necessary)	Date: 11/03/2009	Signature: via e-mail 11/03/2009
Approval of Proposed Implementation:		
Originator Approval: A. Piters, KNMI	Date: 24/04/2009	Signature: via e-mail 24/04/2009

SSAG Approval: H. Bovensmann	Date: 23.3.2009	Signature: e-mail, 23.3.2009
Decision / Approval: OCR shall be implemented as proposed.		
DLR Approval: A. Friker	Date: 09.04.2009	Signature: e-mail, 09.04.2009
Implementation by SOST: **The author of this OCR has specified that only coverages in the descending part of the orbit shall be considered (24/04/2009).** In the first step the limb/nadir sequences 1 and 2 were adjusted such that whenever possible a nadir state covers Cabauw. In total 28 suitable orbits were identified between June 8th and July 19th. The detailed analysis of the second step showed that only one nadir state is executed over Cabauw. This is state ID6 (11th nadir state in the timeline 47). Whenever Cabauw lies at the subsatellite track of ENVISAT state ID6 is replaced by state ID14 (same PET settings, swath width 120 km) and one test timeline is specified replacing, for the duration of this OCR, the nominal timelines 47 (t/l 29 replaces t/l 47) for descending matches. In total 3 orbits with a small swath nadir state over Cabauw could be obtained. For the rest of the 28 orbits the nominal wide swath nadir state is scheduled over Cabauw. The annex lists all orbits with nadir Cabauw coverage. Wide and small swath opportunities can be identified. In the descending part Cabauw coverage occurs about 2080 sec after ANX.		
SOST: M. Gottwald, DLR-IMF	Date: 27/04/2009	Signature: via e-mail 23/04/2009

Annex:

Orbit	Date	ANX Time (UTC)	Swath
38038	09-JUN-2009	10:03:47,9	wide
38052	10-JUN-2009	09:32:10,9	wide
38081	12-JUN-2009	10:09:32,8	wide
38095	13-JUN-2009	09:37:55,8	wide
38124	15-JUN-2009	10:15:17,7	wide
38138	16-JUN-2009	09:43:40,7	wide
38167	18-JUN-2009	10:21:02,6	wide
38181	19-JUN-2009	09:49:25,6	small
38224	22-JUN-2009	09:55:10,6	wide
38238	23-JUN-2009	09:23:33,5	wide
38267	25-JUN-2009	10:00:55,5	wide
38281	26-JUN-2009	09:29:18,5	wide
38310	28-JUN-2009	10:06:40,4	wide
38324	29-JUN-2009	09:35:03,4	wide
38353	01-JUL-2009	10:12:25,3	wide
38367	02-JUL-2009	09:40:48,3	wide
38396	04-JUL-2009	10:18:10,2	wide
38410	05-JUL-2009	09:46:33,2	small
38424	06-JUL-2009	09:14:56,2	wide
38439	07-JUL-2009	10:23:55,1	wide
38453	08-JUL-2009	09:52:18,1	small
38467	09-JUL-2009	09:20:41,1	wide
38496	11-JUL-2009	09:58:03,0	wide
38510	12-JUL-2009	09:26:26,0	wide
38539	14-JUL-2009	10:03:47,9	wide
38553	15-JUL-2009	09:32:10,9	wide
38582	17-JUL-2009	10:09:32,8	wide
38596	18-JUL-2009	09:37:55,8	wide

Table: ENVISAT orbits with Cabauw coverage between June 8th and July 19th

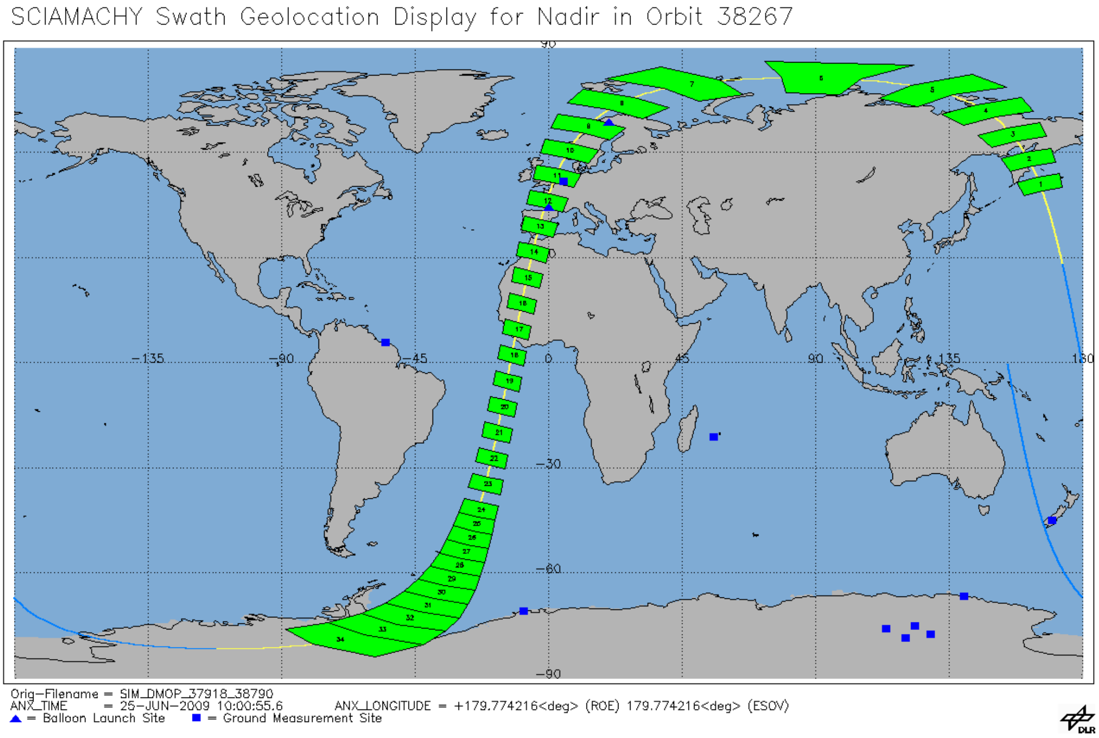

Fig. 1: Example of nadir wide swath coverage over Cabauw

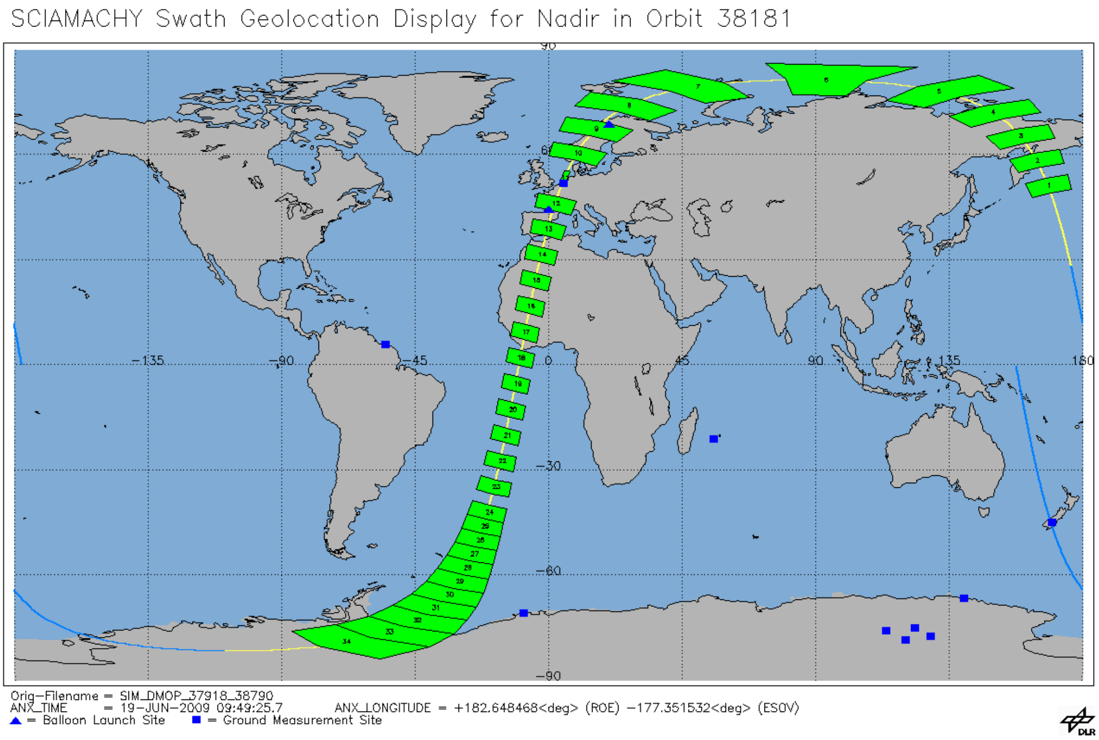

Fig. 2: Example of nadir small swath coverage over Cabauw

OCR_41: Changing Integration Time for Cluster 16 an 18 (Channel 3) for 1-31 Oct 2009 to 0.25 or Shorter

SCIAMACHY	**Operation Change Request**	OCR No: 41 Issue: A

Title: Changing Integration Time for Cluster 16 an 18 (Channel 3) for 1-31 Oct 2009 to 0.25 or Shorter

Description of Request:

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32, OCR_35 and OCR_39 in 2007 and 2008. Results (see attached Figure 1) from analysing SCIA data clusters 9, 15, 16, 17, 18 from these OCR time periods with PhytoDOAS retrieval (See Bracher et al. 2009) show that by including in the analysis cluster 16-18 we can differentiate further the phytoplankton group of cyanobacteria into Prochlorococcus and Synechococcus type cyanobacteria. This is possible because by having the same spatial resolution for clusters 16 and 18, we can use the entire data set from ~530 to 595 nm and resolve by this the phycoerythrine (a pigment which almost only appears in Synechococcus-type cyanobacteria) absorption within this wavelength range. In normal operation the integration time in clusters 16 and 18 is around 1, not enough to get highly spatially resolved results for further phytoplankton modelling approaches. With resolving the different types of cyanobacteria which have different functions within the marine food web and biogeochemical cycles, global phytoplankton biomass estimates and marine nutrient flux studies can be much improved. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups. We choose the time of Oct 1-31 2009, because then we are measuring online in the Pacific tropical and subtropical Ocean between 45°N and 20°S in situ phytoplankton characteristics during a ship cruise (on Research Vessel Sonne, TransBrom 2009). It is sufficient to fulfil the above requirements for solar zenith angles smaller 60°.

Originator: Astrid Bracher	Date of Issue: 2009-07-17	Signature: A. Bracher by email 2009-07-17

Assessment of SSAG (necessary for requests by scientists):

The execution of OCR41 for the time frame 1. - 31.10.2009 is recommended as it improves Chlorophyl retrieval significantly and operational products are not affected.

SSAG: H. Bovensmann, IFE	Date: 27/07/2009	Signature: via e-mail 27/07/2009

Classification of OCR: D

<table>
<tr><td colspan="3">
<u>OCR Analysis (incl. Implementation Option):</u>

The following analysis is identical to that of OCR_39 executed in November/December 2008. A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15, 16, 17 and 18.

The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters.
(Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30 km x 60 km, 1 s to about 30 km x 240 km.)

Increase integration times of “non-special” clusters in channel 7 (48, 49, 51, 53) and blinded pixels in channel 6 (36, 47) to 5 s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above.

The implementation involves CTI-tables only and requires no particular scheduling of specific timelines.
</td></tr>
<tr><td>SOST: M. Gottwald/E. Krieg, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 20/07/2009</td><td>Signature: via e-mail 20/07/2009</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval:
Astrid Bracher</td><td>Date:
22/07/2009</td><td>Signature:
via e-mail 22/07/2009</td></tr>
<tr><td>SSAG Approval:
H. Bovensmann</td><td>Date:
27/07/2009</td><td>Signature:
via e-mail 27/07/2009</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>

Shall be implemented as recommended.</td></tr>
<tr><td>DLR Approval:
(if necessary NIVR, SPEC)
A. Friker</td><td>Date:
26/08/2009</td><td>Signature:
via e-mail 26/08/2009</td></tr>
<tr><td colspan="3"><u>Implementation by SOST:</u>

Validity of the modified co-adding tables 26 and 27 will start in orbit 39664 (1st October 2009) at 00:27:00 UTC.
Return to nominal operation will be effective from orbit 40107 (31st October 2009, 23:16:00 UTC) onwards.</td></tr>
<tr><td>SOST:
E.Krieg/M.Gottwald, DLR-IMF</td><td>Date:
26/08/2009</td><td>Signature:
via e-mail 26/08/2009</td></tr>
</table>

Annex 1:

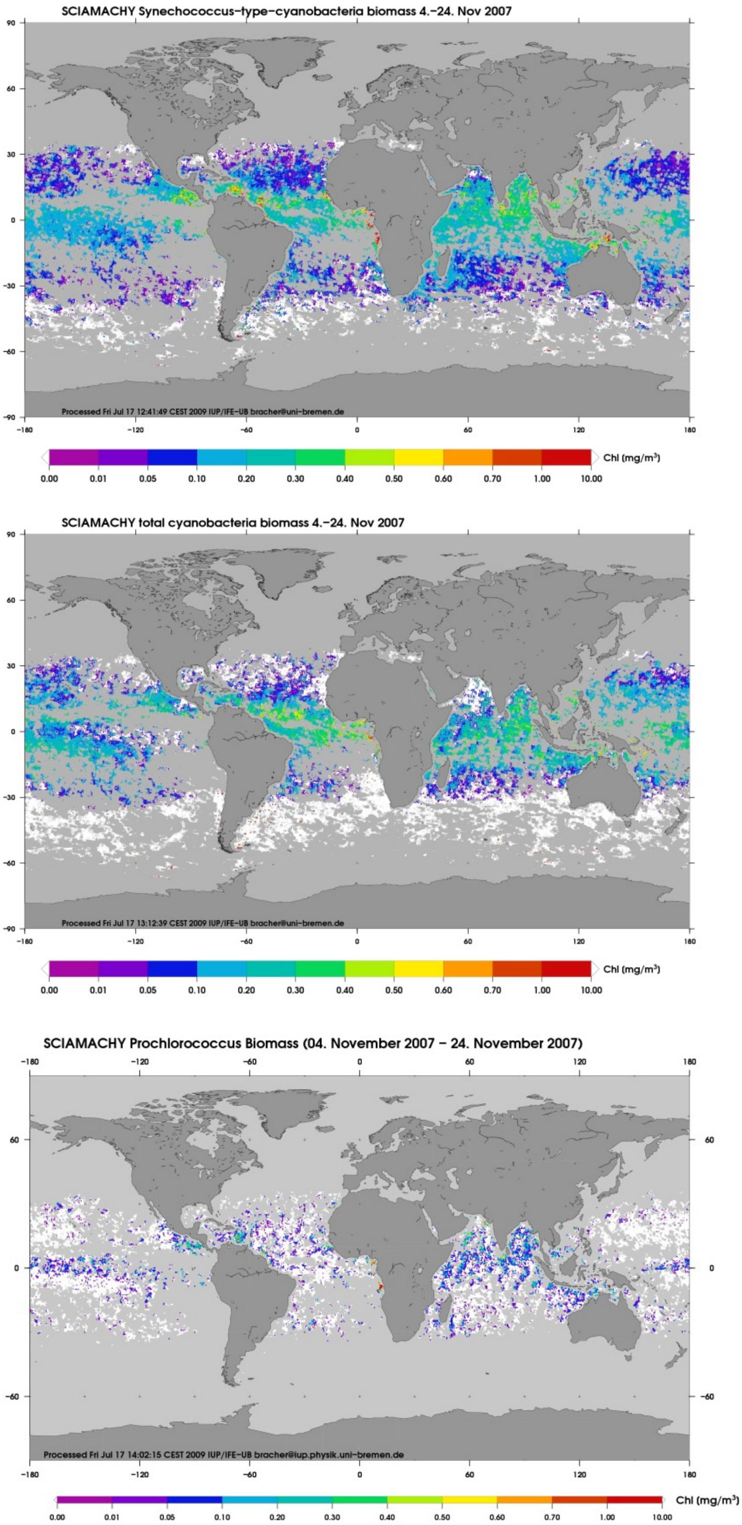

Figure 1: Mean global biomass (in chl-a conc.) of all cyanobacteria (upper panel), Synechococcus-type-cyanobacteria (middle panel) and Prochlorococcus (lower panel) in Nov 2007 (during OCR 32) determined by PhytoDOAS from SCIAMACHY data from Fits within the range of clusters 9, 15, 16, 17 and 18. White pixels signify no correlation with the absorption of the specific phytoplankton group spectrum and therefore SCIAMACHY pixels without any biomass of this group.

Annex 2:

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
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15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	2	0,25	0,5
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	4	0,125	0,5
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							386333

Summary of results N7

State							N7
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,125	0,25
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	40	0,125	5
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	40	0,125	5
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	10	0,5	5
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	10	0,5	5
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390784

The maximum data rate of 390000 bits/s is slightly exceeded. This is considered to be uncritical since nadir states with data rates up to 391034 bits/s have already been run successfully.

OCR_42: Changing Integration Time for Cluster 16 an 18 (channel 3) for 1 April 2010 to 15 May 2010 to 0.25 or Shorter

<table>
<tr><td rowspan="2">SCIAMACHY</td><td rowspan="2">Operation Change Request</td><td>OCR No: 42</td></tr>
<tr><td>Issue:</td></tr>
<tr><td colspan="3">Title: Changing Integration Time for Cluster 16 an 18 (channel 3) for 1 April 2010 to 15 May 2010 to 0.25 or Shorter</td></tr>
<tr><td colspan="3"><u>Description of Request:</u>
We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32, OCR_35, OCR_39 and OCR_41 in 2007, 2008 and 2009. Results (see attached Figure 1) from analysing SCIA data clusters 9, 15, 16, 17, 18 from these OCR time periods with PhytoDOAS retrieval (See Bracher et al. 2009) show that by including in the analysis cluster 16-18 we can differentiate further the phytoplanktom group of cyanobacteria into Prochlorococcus and Synechococcus type cyanobacteria. This is possible because by having the same spatial resolution for clusters 16 and 18, we can use the entire data set from ~530 to 595 nm and resolve by this the phycoerythrine (a pigment which almost only appears in Synecho-coccus-type cyanobacteria) absorption within this wavelength range. In normal operation the integration time in clusters 16 and 18 is around 1, not enough to get highly spatially resolved results for further phytoplankton modelling approaches. With resolving the different types of cyanobacteria which have different functions within the marine food web and biogeochemical cycles, global phytoplankton biomass estimates and marine nutrient flux studies can be much improved. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups. We choose the time of 1 April to 17 May 2010, because then we are measuring online in the tropical and subtropical Atlantic Ocean between 45°N and 45°S in situ phytoplankton characteristics during a ship cruise (on Research Vessel Polarstern, ANTXXVI-4). It is sufficient to fullfil the above requirements for solar zenith angles smaller 60°.</td></tr>
<tr><td>Originator:Astrid Bracher</td><td>Date of Issue: 2010-02-23</td><td>Signature:A. Bracher by email 2010-02-23</td></tr>
<tr><td colspan="3"><u>Assessment of SSAG (necessary for requests by scientists):</u>
The proposed OCR will allow to derive new information on phytoplankton groups, and the OCR is therefore recommended to be implemented.</td></tr>
<tr><td>SSAG: H. Bovensmann</td><td>Date: 28.2.2010</td><td>Signature: H. Bovensmann by e-mail, 28.2.2010</td></tr>
<tr><td colspan="3">Classification of OCR: D</td></tr>
</table>

<table>
<tr><td colspan="3">

OCR Analysis (incl. Implementation Option):

The following analysis is identical to that of OCR_41 executed in October 2009. A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15, 16, 17 and 18.

The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters.
(Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30km x 60 km, 1 s to about 30km x 240 km.)

Increase integration times of “non-special” clusters in channel 7 (48, 49, 51, 53) and blinded pixels in channel 6 (36, 47) to 5 s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above.

The implementation involves CTI-tables only and requires no particular scheduling of specific timelines.

</td></tr>
<tr><td>SOST: M. Gottwald/E. Krieg, DLR-IMF
(ESA, Industry if necessary)</td><td>Date: 24/02/2010</td><td>Signature: via e-mail 24/02/2010</td></tr>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval: A. Bracher</td><td>Date: 24/02/2010</td><td>Signature: via e-mail 24/02/2010</td></tr>
<tr><td>SSAG Approval: Bovensmann</td><td>Date: 28.2.2010</td><td>Signature: H. Bovensmann, via e-mail 28.2.2010</td></tr>
<tr><td colspan="3">

Decision / Approval:

Shall be implemented as recommended.

</td></tr>
<tr><td>DLR Approval: A. Friker
(if necessary NIVR, SPEC)</td><td>Date: 01.03.2010</td><td>Signature: A. Friker via e-mail 01.03.2010</td></tr>
<tr><td colspan="3">

Implementation by SOST:

Validity of the modified co-adding tables 26 and 27 will start in orbit 42269 (1st April 2010) at 00:04:00 UTC.
Return to nominal operation will be effective from orbit 42914 (16th May 2010, about 01:23:33 UTC) onwards.

</td></tr>
<tr><td>SOST: M. Gottwald/E. Krieg, DLR-IMF</td><td>Date: 24/02/2010</td><td>Signature: via e-mail 24/02/2010</td></tr>
</table>

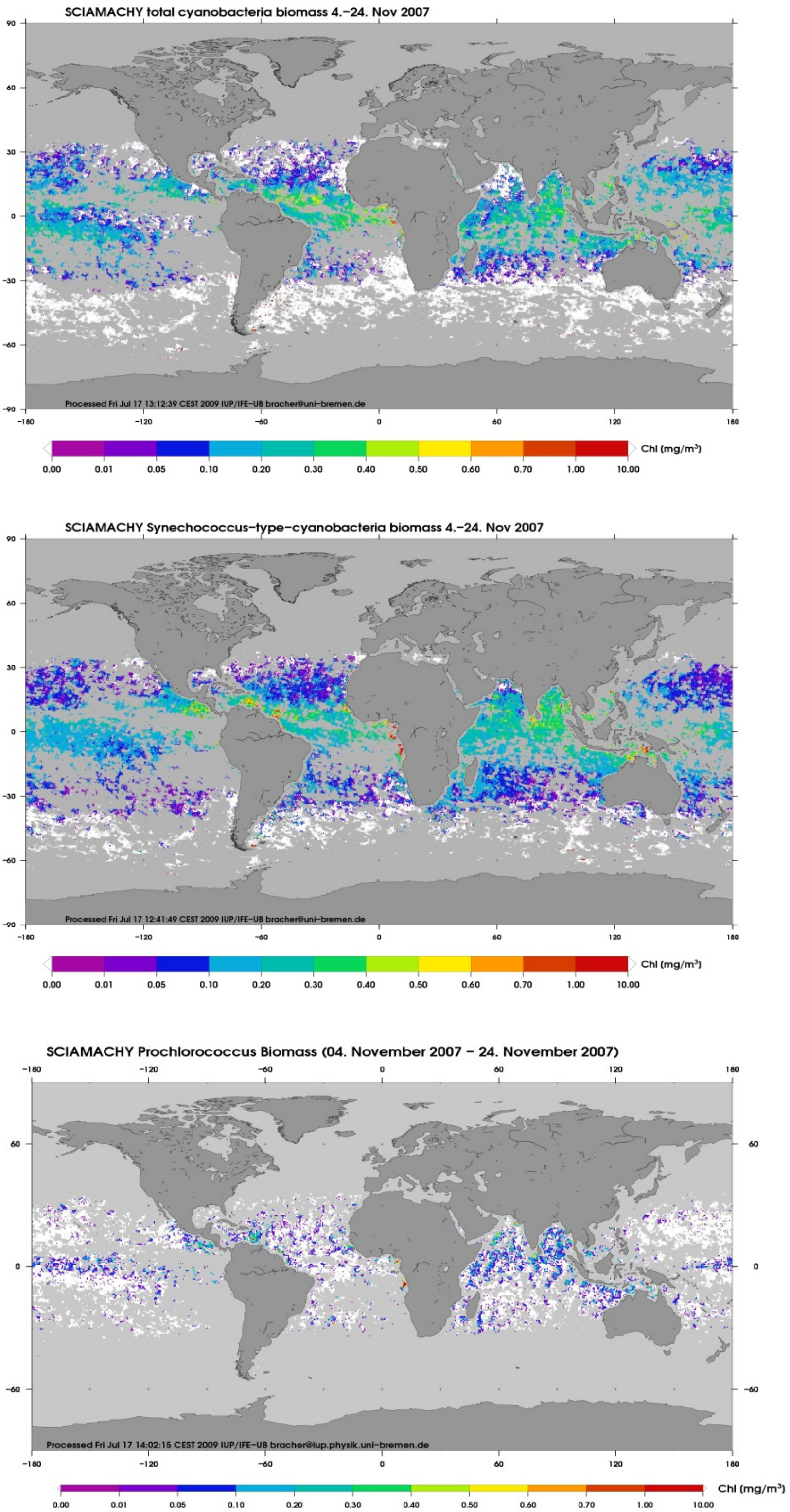

Figure: Mean global biomass (in chl-a conc.) of all cyanobacteria (upper panel), Synechococcus-type-cyanobacteria (middle panel) and Prochlorococcus (lower panel) in Nov 2007 (during OCR 32) determined by PhytoDOAS from SCIAMACHY data from Fits within the range of clusters 9, 15, 16, 17 and 18. White pixels signify no correlation with the absorption of the specific phytoplankton group spectrum and therefore SCIAMACHY pixels without any biomass of this group.

OCR_43: Revision of Calibration States 8, 26, 46, 63 and 67

Operation Change Request

OCR No: 43

Issue:

Title: Revision of Calibration States 8, 26, 46, 63 and 67

Description of Request:

The goal of the five "Dark Current Calibration" states (8, 26, 46, 63 and 67) are to derive the bias component for each pixel, referred to as fixed pattern noise (FPN) or analog offset, and a time-dependent component, referred to as leakage current (LC). The FPN and LC are calculated, for each pixel, by a (weighted) linear least square fit, see ATBD (section 3.4).

The requested modifications aim to increase the coverage of PET's used for science measurements, replace noisy long PET measurements (> 1.5 sec) by more accurate PET's between 0.25 and 0.75 seconds. Channel 1 and 2 measurements with integration times > 1 second are likely affected by high energy particle hits. Channel 8 measurements with PET's equal to 2 seconds have many pixels going into saturation or they seem to get in the strong non-linear part of the QE curve.

New Pixel Exposure Times and Co-Adding Factors:

State_id: 46 (dark current 1)
Repetitions in state: 10
State duration: 10 seconds

Channel	1	2	3	4	5	6	7	8
PET	0.0625	0.0625	0.0625	0.0625	0.125	0.0625	0.0625	0.0625
coadding	8	8	8	8	4	8	16	8

State_id: 63 (dark current 2)
Repetitions in state: 40
State duration: 30 seconds

Channel	1	2	3	4	5	6	7	8
PET	0.375	0.750	0.375	0.375	0.375	0.375	0.375	0.375
coadding	2	1	2	2	1	1	2	1

State_id: 67 (dark current 3)
Repetitions in state: 80
State duration: 80 seconds

Channel	1	2	3	4	5	6	7	8
PET	0.5	0.5	0.125	0.125	0.5	0.125	1.0	1.0
coadding	1	1	4	4	1	2	1	1

Description of Request (continued):

State_id: 26 (dark current 4)
Repetitions in state: 10
State duration: 30 seconds

Channel	1	2	3	4	5	6	7	8
PET	1.0	1.5	0.75	0.75	1.5	1.5	0.5	0.5
coadding	1	1	2	2	1	1	1	1

State_id: 8 (dark current 5)
Repetitions in state: 10
State duration: 40 seconds

Channel	1	2	3	4	5	6	7	8
PET	0.25	0.25	1.0	1.0	0.25	0.5	0.125	0.125
coadding	2	2	1	1	2	1	4	4

Originator: Richard van Hees / SRON	Date of Issue: April 27, 2010	Signature: RvH

Assessment of SSAG (necessary for requests by scientists):

Investigation on implementation options are recommended, as the proposed change has the potential to improve dark current characterisation for short PET's. Special attention by SOST needs to be paid to avoid adverse effects for nominal nadir, limb, occultation and calibration measurements.

It is recommend that after a sufficient number of new dark current measurements are taken, the L2 experts needs to perform retrievals using L1 data with new dark currents applied. Results should be reported within 3 month after implementation of the OCR, assuming that after 4 weeks L1 data with new darks are available.

SSAG: H. Bovensmann	Date: 17.5.2010	Signature: e-mail, 17.5.2010

Classification of OCR:

OCR Analysis (incl. Implementation Option):

Following the proposed modifications to the dark states 8, 26, 46, 63 and 67 only settings of the pixel exposures times and the 5 co-adding tables uniquely allocated to these states are necessary. This will result in totally 10 CTI-tables to be created. The excerpts from the PET-sheet and the Co-Add-sheet relevant for the 5 states and detailing the future setting of PETs and Co_Adds are given further down.

State ID46 will produce a mean data rate of 391.6416 kb/s which is slightly exceeding the nominal limit given for low data-rate of 390.000 kb/s. This small excess is expected to be tolerated by the PMC.

No other states than the 5 dark states are affected by the proposed modifications.

No changes to the duration of any state are required. All present timelines can remain unchanged. Thus the above implementation is decoupled from the nominal planning cycle such that it can be made effective after receipt of the final approval for this OCR.

OCR Analysis (continued): **Note: This OCR_43 is not related to the upcoming OCR_44, which concerns partly the settings of the dark states but is intended to be implemented for a short test session of several orbits only.**		
SOST: (ESA, Industry if necessary) E.Krieg; M.Gottwald	Date: 18.05.2010	Signature: email 18.05.2010
Approval of Proposed Implementation:		
Originator Approval: R. van Hees	Date: 19. Mai 2010	Signature: via e-mail 19. Mai 2010 17:54
SSAG Approval: H. Bovensmann	Date: 19.05.2010	Signature: via e-mail 19.05.2010 17:54
Decision / Approval: Approved for preliminary implementation. Scientific assessment of results is needed (as recommended by SSAG) before final decision. (for implementation see SOST below).		
DLR Approval: (if necessary NIVR, SPEC) Achim Friker	Date: 21.05.2010	Signature: via E-Mail 21.05.2010
Implementation by SOST: OCR_43 will be implemented in orbit 43362 on 16th June 2010 with validity from 08:33 UTC onwards. In total 2*5 CTI-files will be loaded to modify the PET-tables for states ID 08, 26, 46, 63 and 67 and the related Co-Adding tables 52; 51; 45; 49, 50 (see state_index-table). OCR_43 is planned as a permanent change and therefore generates a new final flight configuration also meaning that this is reflected in FOCC's procedures from the date of implementation onwards. If after data analysis it would be decided that the OCR_43 settings are not appropriate and further modifications needed (e.g. restore the former configuration) this would require a new OCR.		
SOST M.Gottwald; E.Krieg	Date: 21.05.2010	Signature: e-mail 21.05.2010

Annex

PET

State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
BCPS												
8	Low	4	4	4	4	16	16	4	8	2	2	Dark Current 5
	High	4	4	4	4	16	16	4	8	2	2	Dark Current 5
26	Low	16	16	24	24	12	12	24	24	8	8	Dark Current 4
	High	16	16	24	24	12	12	24	24	8	8	Dark Current 4
46	Low	1	1	1	1	1	1	2	1	1	1	Dark Current 1
	High	1	1	1	1	1	1	2	1	1	1	Dark Current 1
63	Low	6	6	12	12	6	6	6	6	6	6	Dark Current 2
	High	6	6	12	12	6	6	6	6	6	6	Dark Current 2
67	Low	8	8	8	8	2	2	8	2	16	16	Dark Current 3
	High	8	8	8	8	2	2	8	2	16	16	Dark Current 3
Support (sec)												
8	Low	0,25000	0,25000	0,25000	0,25000	1,00000	1,00000	0,25000	0,50000	0,12500	0,12500	Dark Current 5
	High	0,25000	0,25000	0,25000	0,25000	1,00000	1,00000	0,25000	0,50000	0,12500	0,12500	Dark Current 5
26	Low	1,00000	1,00000	1,50000	1,50000	0,75000	0,75000	1,50000	1,50000	0,50000	0,50000	Dark Current 4
	High	1,00000	1,00000	1,50000	1,50000	0,75000	0,75000	1,50000	1,50000	0,50000	0,50000	Dark Current 4
46	Low	0,06250	0,06250	0,06250	0,06250	0,06250	0,06250	0,12500	0,06250	0,06250	0,06250	Dark Current 1
	High	0,06250	0,06250	0,06250	0,06250	0,06250	0,06250	0,12500	0,06250	0,06250	0,06250	Dark Current 1
63	Low	0,37500	0,37500	0,75000	0,75000	0,37500	0,37500	0,37500	0,37500	0,37500	0,37500	Dark Current 2
	High	0,37500	0,37500	0,75000	0,75000	0,37500	0,37500	0,37500	0,37500	0,37500	0,37500	Dark Current 2
67	Low	0,50000	0,50000	0,50000	0,50000	0,12500	0,12500	0,50000	0,12500	1,00000	1,00000	Dark Current 3
	High	0,50000	0,50000	0,50000	0,50000	0,12500	0,12500	0,50000	0,12500	1,00000	1,00000	Dark Current 3

Co-Adding

CO_ADDING	45							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	8	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	4	4	4	8	8	8	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	16	16	16	16	16	8	8	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	51							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	49							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	2	2	2	2	2	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	52							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	2	2	2	2	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	2	2
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	2	2	2	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	4	4	4
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	50							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	4	4	4	4
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	4	4	4	4	4	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	2	2	2	2	2
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

OCR_44: Channel 8 Anti-saturation

<table>
<tr><td>SCIAMACHY</td><td colspan="2">Operation Change Request</td><td>OCR No: 44
Issue: final</td></tr>
<tr><td colspan="4">Title: Channel 8 Anti-saturation</td></tr>
<tr><td colspan="4"><u>Description of Request:</u>
Win back a number of saturated pixels in channel 8 by reducing the Pixel Exposure Time (PET) by a factor of 4 or 8. The mentioned pixels are affected by extreme dark current and hence quickly saturate. Reduction of the PET will reduce the total accumulated dark current to within ADC range.
It is estimated that about 40 and 55 pixels can be salvaged for factors 4 and 8, respectively. Evaluation of existing short dark states shows that there will be 30% and 40% additional noise for the remaining good pixels for factors 4 and 8, respectively.
For optimal dark correction, each nadir state should have a matching eclipse dark state and limb state with respect to Pixel Exposure Time. To stay in-line with low data rate requirements, co-adding should be used.
To test nadir measurements at maximum signal intensity, orbits over the Sahara desert are essential. It is preferred to have as much land coverage as possible. At least 3 consecutive orbits with factor 4 and 3 consecutive orbits with factor 8 are required. See the tables on the next pages for details.</td></tr>
<tr><td>Originator: Pieter van der Meer</td><td colspan="2">Date of Issue: May 21st 2010</td><td>Signature: PM</td></tr>
<tr><td colspan="4"><u>Assessment of SSAG (necessary for requests by scientists):</u>
The investigation of the implementation is recommended as good pixels in channel 8 are rare. It is recommended to investigate implementation together with OCR_43 “Revision of calibration states 8, 26, 46, 63 and 67” by R. van Hees.</td></tr>
<tr><td>SSAG:
H. Bovensmann</td><td colspan="2">Date:
17.5.2010</td><td>Signature:
e-mail, 17.5.2010</td></tr>
<tr><td colspan="4">Classification of OCR:</td></tr>
<tr><td colspan="4"><u>OCR Analysis (incl. Implementation Option):</u>
The OCR will be executed in 2 sessions since the identical co-adding tables and the PET-table must be modified for the reduction of channel 8 PET’s for 2 over-flight occasions of North Africa.
Factor-4 parameters will be loaded for 3 subsequent orbits and for the following occasion factor-8 parameters.
Factor 4 setting requires upload of new PET’s for 15 states and 15 co-adding tables, Factor 8 setting requires upload of new PET’s for 13 states and 13 co-adding tables. Reference for these modifications is the new Final Flight Configuration based on OCR_43. The corresponding PET and co-adding settings are given in the annex.
<u>Time frame:</u>
OCR_44 will be planned for the first days in August to avoid mixing with OCR_46. OCR_43 will be part of the basic flight configuration by then.</td></tr>
</table>

SOST: (ESA, Industry if necessary)	Date: 15.06.2010	Signature: E.Krieg
Approval of Proposed Implementation:		
Originator Approval: Pieter van der Meer	Date: 16.06.2010	Signature: PM
SSAG Approval: H. Bovensmann	Date: 21.6.2010	Signature: e-mail, 21.6.2010
Decision / Approval: Shall be implemented as recommended.		
DLR Approval: A. Friker (if necessary NIVR, SPEC)	Date: 21.06.2010	Signature: via e-mail 21.06.2010
Implementation by SOST: Execution of 3 subsequent orbits with PETs reduced by factor 4 and related co-adding are planned 6th August from orbit 44091 onwards. This will be followed by the execution of 3 subsequent orbits with PETs reduced by factor 8 and related co-adding on 9th August from orbit 44134 onwards. The ground tracks of these orbits are given in annex 6. The validity start time for the parameter CTI tables will be set accordingly. **Note: The MCMDs for uploading the CTI tables must be separated by 10 sec. Because the number of CTI table uploads is so large, the planned gap between the end of the eclipse timeline in orbits 44090 and 44133 is too short to. Therefore these eclipse timelines are not executed. The same applies to orbits 44093 and 44136 when the CTI tables are commanded back to the nominal final flight configuration.**		
SOST M.Gottwald; E.Krieg	Date: 22.06.2010	Signature: e-mail 22.06.2010

Annex 1: Intended PET and co-adding changes based on the proposal of the originator.

Exposure time reduced by factor 4:

Channel 8 (main cluster)

State ID	Old PET value	New PET value	Duration	Co-adding table	Old co-adding value	New co-adding value
1	1	1/4	65	21	1	4
2	1	1/4	65	22	1	4
3	1	1/4	65	23	1	4
4	1	1/4	65	24	1	4
5	1	1/4	65	25	1	4
6	1/2	1/8	65	26	1	4
7	1/2	1/8	65	27	1	4
8	1/8	1/4	80	52	4	2
26	See OCR43	See OCR43	See OCR43	51	See OCR43	See OCR43
28	1.5	1/4	52.31	1	1	6
29	1.5	1/4	52.31	2	1	6
30	3/8	1/8	52.31	3	1	3
31	3/8	1/8	52.31	4	1	3
32	3/8	1/8	52.31	5	1	3
33	1.5	1/4	52.31	6	1	6
46	1/16	1/8	10	45	8	4
63	See OCR43	See OCR43	See OCR43	49	See OCR43	See OCR43
67	See OCR43	See OCR43	See OCR43	50	See OCR43	See OCR43

Exposure time reduced by factor 8:

Channel 8 (main cluster)

State ID	Old PET value	New PET value	Duration	Co-adding table	Old co-adding value	New co-adding value
1	1	1/8	65	21	1	8
2	1	1/8	65	22	1	8
3	1	1/8	65	23	1	8
4	1	1/8	65	24	1	8
5	1	1/8	65	25	1	8
6	1/2	1/16	65	26	1	8
7	1/2	1/16	65	27	1	8
8	See OCR43	See OCR43	See OCR43	52	See OCR43	See OCR43
26	See OCR43	See OCR43	See OCR43	51	See OCR43	See OCR43
28	1.5	1/8	52.31	1	1	12
29	1.5	1/8	52.31	2	1	12
30	3/8	1/16	52.31	3	1	6
31	3/8	1/16	52.31	4	1	6
32	3/8	1/16	52.31	5	1	6
33	1.5	1/8	52.31	6	1	12
46	See OCR43	See OCR43	See OCR43	45	See OCR43	See OCR43
63	See OCR43	See OCR43	See OCR43	49	See OCR43	See OCR43
67	See OCR43	See OCR43	See OCR43	50	See OCR43	See OCR43

Channel 7 (main part – increased integration times to facilitate higher channel 8 bit rates)

State ID	Old PET value	New PET value	Duration	Co-adding table	Old co-adding value	New co-adding value
6	1/2	1/2	65	26	1	1
7	1/2	1/2	65	27	1	1
8	See OCR43	See OCR43	See OCR43	52	See OCR43	See OCR43
26	See OCR43	See OCR43	See OCR43	51	See OCR43	See OCR43
30	3/8	3/8	52.31	3	1	1
31	3/8	3/8	52.31	4	1	1
32	3/8	3/8	52.31	5	1	1
46	See OCR43	See OCR43	See OCR43	45	See OCR43	See OCR43
63	See OCR43	See OCR43	See OCR43	49	See OCR43	See OCR43
67	See OCR43	See OCR43	See OCR43	50	See OCR43	See OCR43

Annex 2: Cluster allocation and required PET and co-adding together with the resulting signal integration time for the 7 nadir states and the 6 limb states (PET reduction by factor 4). As summary the total data rate for the states is given in the last row of each page.

StateOpt3_ocr44_factor4.xls Summary

Summary of results N1

State							N1	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	1	1	1
13	overlap region	391,88	404,10	3	1	1	1
14		404,34	423,73	3	1	1	1
15	VIS DOAS, PMD 2	423,97	526,96	3	1	1	1
16		527,20	544,56	3	1	1	1
17	AE	544,80	565,08	3	1	1	1
18		565,31	597,28	3	1	1	1
19	overlap region	597,52	605,48	3	1	1	1
20	Blinded Pixel	627,41	628,40	3	1	1	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	1	0,125	0,125
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	1	0,125	0,125
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	1	0,125	0,125
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	1	0,125	0,125
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	4	0,25	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,25	1
56	Blinded Pixel	2384,60	2385,61	8	4	0,25	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							326618

Stefan Noël Seite 1 09.06.2010

Summary of results N2

State						N2	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	1	1	1
13	overlap region	391,88	404,10	3	1	1	1
14		404,34	423,73	3	1	1	1
15	VIS DOAS, PMD 2	423,97	526,96	3	1	1	1
16		527,20	544,56	3	1	1	1
17	AE	544,80	565,08	3	1	1	1
18		565,31	597,28	3	1	1	1
19	overlap region	597,52	605,48	3	1	1	1
20	Blinded Pixel	627,41	628,40	3	1	1	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	1	0,125	0,125
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	1	0,125	0,125
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	1	0,125	0,125
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	1	0,125	0,125
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	4	0,25	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,25	1
56	Blinded Pixel	2384,60	2385,61	8	4	0,25	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							326618

Summary of results N3

State						N3	
Cluster Ind.	**Description**	**min/max wavelength , nm**		**Channel**	**Coadding**	**PET (s)**	**Int. Time(s)**
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	4	0,25	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,25	1
56	Blinded Pixel	2384,60	2385,61	8	4	0,25	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

Summary of results N4

State						N4	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	4	0,25	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,25	1
56	Blinded Pixel	2384,60	2385,61	8	4	0,25	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

StateOpt3_ocr44_factor4.xls Summary

Summary of results N5

State							N5
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	4	0,25	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,25	1
56	Blinded Pixel	2384,60	2385,61	8	4	0,25	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	16	0,0625	1
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	16	0,0625	1
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	4	0,25	1
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	8	0,125	1
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	8	0,125	1
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	8	0,125	1
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	8	0,125	1
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	2	0,5	1
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	2	0,5	1
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	~~4~~ 8	0,125	~~0,5~~ 1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,125	0,5
56	Blinded Pixel	2384,60	2385,61	8	~~4~~ 8	0,125	~~0,5~~ 1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							373818

StateOpt3_ocr44_factor4.xls Summary

Summary of results N7

State						N7	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	16	0,0625	1
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	16	0,0625	1
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	4	0,125	0,5
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	4	0,125	0,5
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							380429

Summary of results L1

State						L1	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	2	0,75	1,5
8	unused pixel	411,63	404,07	2b	1	0,75	0,75
9	virtual channel 2b	403,96	320,14	2b	1	0,75	0,75
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	1	0,375	0,375
14	unused pixel	386,09	391,63	3	1	0,375	0,375
15	Channel 3 (main part)	391,88	605,48	3	1	0,375	0,375
16	unused pixel	605,72	627,17	3	1	0,375	0,375
17	Blinded Pixel	627,41	628,40	3	1	0,375	0,375
18	Blinded Pixel	595,36	596,26	4	1	0,375	0,375
19	unused pixel	596,48	597,38	4	1	0,375	0,375
20	Channel 4 (main part)	597,60	789,85	4	1	0,375	0,375
21	unused pixel	790,06	811,25	4	1	0,375	0,375
22	Blinded Pixel	811,47	812,33	4	1	0,375	0,375
23	Blinded Pixel	773,21	774,43	5	1	0,375	0,375
24	unused pixel	774,73	775,94	5	1	0,375	0,375
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	1	0,375	0,375
27	Blinded Pixel	1061,68	1062,83	5	1	0,375	0,375
28	Blinded Pixel	971,46	978,74	6	1	0,375	0,375
29	unused pixel	979,55	990,03	6	1	0,375	0,375
30	Channel 6/6+ (main part)	990,84	1750,09	6	1	0,375	0,375
31	unused pixel	1750,92	1764,24	6	1	0,375	0,375
32	Blinded Pixel	1765,07	1772,59	6	1	0,375	0,375
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	6	0,25	1,5
39	Channel 8	2260,61	2384,49	8	6	0,25	1,5
40	Blinded Pixel	2384,60	2385,61	8	6	0,25	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							255348

StateOpt3_ocr44_factor4.xls Summary

Summary of results L2

State						L2	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	2	0,75	1,5
8	unused pixel	411,63	404,07	2b	1	0,75	0,75
9	virtual channel 2b	403,96	320,14	2b	1	0,75	0,75
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel	627,41	628,40	3	24	0,0625	1,5
18	Blinded Pixel	595,36	596,26	4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel	811,47	812,33	4	24	0,0625	1,5
23	Blinded Pixel	773,21	774,43	5	8	0,1875	1,5
24	unused pixel	774,73	775,94	5	8	0,1875	1,5
25	Channel 5 (main part)	776,24	1056,25	5	2	0,1875	0,375
26	unused pixel	1056,53	1061,40	5	8	0,1875	1,5
27	Blinded Pixel	1061,68	1062,83	5	8	0,1875	1,5
28	Blinded Pixel	971,46	978,74	6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel	1765,07	1772,59	6	24	0,0625	1,5
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	6	0,25	1,5
39	Channel 8	2260,61	2384,49	8	6	0,25	1,5
40	Blinded Pixel	2384,60	2385,61	8	6	0,25	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							324660

Summary of results L3

State						L3	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel	627,41	628,40	3	24	0,0625	1,5
18	Blinded Pixel	595,36	596,26	4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel	811,47	812,33	4	24	0,0625	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel	1765,07	1772,59	6	24	0,0625	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	3	0,125	0,375
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

StateOpt3_ocr44_factor4.xls Summary

Summary of results							L4
State						L4	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel	627,41	628,40	3	8	0,1875	1,5
18	Blinded Pixel	595,36	596,26	4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel	811,47	812,33	4	8	0,1875	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel	1765,07	1772,59	6	8	0,1875	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	3	0,125	0,375
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

StateOpt3_ocr44_factor4.xls Summary

Summary of results							L5
State						L5	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel	627,41	628,40	3	8	0,1875	1,5
18	Blinded Pixel	595,36	596,26	4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel	811,47	812,33	4	8	0,1875	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel	1765,07	1772,59	6	8	0,1875	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	3	0,125	0,375
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

Summary of results L6

State						L6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	1	1,5	1,5
8	unused pixel	411,63	404,07	2b	1	1,5	1,5
9	virtual channel 2b	403,96	320,14	2b	1	1,5	1,5
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	1	0,75	0,75
14	unused pixel	386,09	391,63	3	1	0,75	0,75
15	Channel 3 (main part)	391,88	605,48	3	1	0,75	0,75
16	unused pixel	605,72	627,17	3	1	0,75	0,75
17	Blinded Pixel	627,41	628,40	3	1	0,75	0,75
18	Blinded Pixel	595,36	596,26	4	1	0,75	0,75
19	unused pixel	596,48	597,38	4	1	0,75	0,75
20	Channel 4 (main part)	597,60	789,85	4	1	0,75	0,75
21	unused pixel	790,06	811,25	4	1	0,75	0,75
22	Blinded Pixel	811,47	812,33	4	1	0,75	0,75
23	Blinded Pixel	773,21	774,43	5	1	1,5	1,5
24	unused pixel	774,73	775,94	5	1	1,5	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	1,5	1,5
26	unused pixel	1056,53	1061,40	5	1	1,5	1,5
27	Blinded Pixel	1061,68	1062,83	5	1	1,5	1,5
28	Blinded Pixel	971,46	978,74	6	1	1,5	1,5
29	unused pixel	979,55	990,03	6	1	1,5	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	1	1,5	1,5
31	unused pixel	1750,92	1764,24	6	1	1,5	1,5
32	Blinded Pixel	1765,07	1772,59	6	1	1,5	1,5
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	6	0,25	1,5
39	Channel 8	2260,61	2384,49	8	6	0,25	1,5
40	Blinded Pixel	2384,60	2385,61	8	6	0,25	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							132554

Annex 3: Modified entries in PET and co-adding tables required for OCR_44 implementation.

PET table: PET reduction by factor 4:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Nadir 01	1	Low	1,	,5	,5	,5	1,	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 02	2	Low	1,	,5	,5	,5	1,	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 03	3	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 04	4	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 05	5	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 06	6	Low	1,	,25	,25	,25	,0625	,0625	,25	,125	,5	,125	changed due to OCR_44
Nadir 07	7	Low	1,	,25	,25	,25	,0625	,0625	,125	,125	,5	,125	changed due to OCR_44
Dark_Current_Cal_5	8	Low	,25	,25	,25	,25	1,	1,	,25	,5	,125	,25	changed due to OCR_007&OCR_43&OCR_44
Dark_Current_Cal_4	26	Low	1,	1,	1,5	1,5	,75	,75	1,5	1,5	,5	,5	changed due to OCR_43
Limb 01	28	Low	1,5	1,5	,75	1,5	,375	,375	,375	,375	1,5	,25	changed due to OCR_44
Limb 02	29	Low	1,5	1,5	,75	1,5	,0625	,0625	,1875	,0625	1,5	,25	changed due to OCR_44
Limb 03	30	Low	1,5	,375	,375	,375	,0625	,0625	,375	,0625	,375	,125	changed due to OCR_44
Limb 04	31	Low	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,125	changed due to OCR_44
Limb 05	32	Low	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,125	changed due to OCR_44
Limb 06	33	Low	1,5	1,5	1,5	1,5	,75	,75	1,5	1,5	1,5	,25	changed due to OCR_44
Dark_Current_Cal_1	46	Low	,0625	,0625	,0625	,0625	,0625	,0625	,125	,0625	,0625	,125	changed due to OCR_43&OCR_44
Dark_Current_Cal_2	63	Low	,375	,375	,75	,75	,375	,375	,375	,375	,375	,375	changed due to OCR_43
Dark_Current_Cal_3	67	Low	,5	,5	,5	,5	,125	,125	,5	,125	1,	1,	changed due to OCR_007&OCR_43

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Nadir 01	1	High	1,	,5	,5	,5	1,	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 02	2	High	1,	,5	,5	,5	1,	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 03	3	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 04	4	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 05	5	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,25	changed due to OCR_44
Nadir 06	6	High	1,	,25	,25	,25	,0625	,0625	,25	,125	,5	,125	changed due to OCR_44
Nadir 07	7	High	1,	,25	,25	,25	,0625	,0625	,125	,125	,5	,125	changed due to OCR_44
Dark_Current_Cal_5	8	High	,25	,25	,25	,25	1,	1,	,25	,5	,125	,25	changed due to OCR_007&OCR_43&OCR_44
Dark_Current_Cal_4	26	High	1,	1,	1,5	1,5	,75	,75	1,5	1,5	,5	,5	changed due to OCR_43
Limb 01	28	High	1,5	1,5	,75	1,5	,375	,375	,375	,375	1,5	,25	changed due to OCR_44
Limb 02	29	High	1,5	1,5	,75	1,5	,0625	,0625	,1875	,0625	1,5	,25	changed due to OCR_44
Limb 03	30	High	1,5	,375	,375	,375	,0625	,0625	,375	,0625	,375	,125	changed due to OCR_44
Limb 04	31	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,125	changed due to OCR_44
Limb 05	32	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,125	changed due to OCR_44
Limb 06	33	High	1,5	1,5	1,5	1,5	,75	,75	1,5	1,5	1,5	,25	changed due to OCR_44
Dark_Current_Cal_1	46	High	,0625	,0625	,0625	,0625	,0625	,0625	,125	,0625	,0625	,125	changed due to OCR_43&OCR_44
Dark_Current_Cal_2	63	High	,375	,375	,75	,75	,375	,375	,375	,375	,375	,375	changed due to OCR_43
Dark_Current_Cal_3	67	High	,5	,5	,5	,5	,125	,125	,5	,125	1,	1,	changed due to OCR_007&OCR_43

Co-adding table for PET reduction by factor 4:

Output 2 CTI								
CO_ADDING	1							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	2	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	6	6	6
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	2							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	2	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	24	24	6	24
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	24	24	24	6	24	24	8	8
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	2	8	8	24	24	6	24	24
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	6	6	6
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	3							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	24	24	6	24
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	24	24	24	6	24	24	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	24	24	6	24	24
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	12	3	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI								
CO_ADDING	4							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	8	8	2	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	2	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	8	8	2	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	12	3	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	5							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	8	8	2	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	2	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	8	8	2	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	12	3	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	6							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	6	6	6
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI								
CO_ADDING	21							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	22							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	23							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

CO_ADDING	24							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	25							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	26							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	16	16	16	4	16
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	16	16	16	16	16	16	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	16	4	16	16	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	8	8	8	8	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	8	8	8	8	8	8	8	2
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	2	2	2	2	2	8	4	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

CO_ADDING	27							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	5	1	1	2	1	20	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	16	16	16	4	16
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	16	16	16	16	16	16	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	16	4	16	16	8	8	8	4
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	8	8	8	8	8	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	2
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	2	1	2	1	2	8	4	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	45							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	8	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	4	4	4	8	8	8	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	16	16	16	16	16	4	4	4
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	49							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	2	2	2	2	2	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

CO_ADDING	50							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	4	4	4	4
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	4	4	4	4	4	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	2	2	2	2	2
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	51							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	52							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	2	2	2	2	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	2	2
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	2	2	2	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	2	2	2
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Annex 4: Cluster allocation and required PET and co-adding together with the resulting signal integration time for the 7 nadir states and the 6 limb states (PET reduction by factor 8). As summary the total data rate for the states is given in the last row of each page.

StateOpt3_ocr44_factor8.xls Summary

Summary of results N1

State						N1	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	1	1	1
13	overlap region	391,88	404,10	3	1	1	1
14		404,34	423,73	3	1	1	1
15	VIS DOAS, PMD 2	423,97	526,96	3	1	1	1
16		527,20	544,56	3	1	1	1
17	AE	544,80	565,08	3	1	1	1
18		565,31	597,28	3	1	1	1
19	overlap region	597,52	605,48	3	1	1	1
20	Blinded Pixel	627,41	628,40	3	1	1	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	1	0,125	0,125
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	1	0,125	0,125
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	1	0,125	0,125
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	1	0,125	0,125
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,125	1
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							326618

Summary of results N2

State							N2
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	1	1	1
13	overlap region	391,88	404,10	3	1	1	1
14		404,34	423,73	3	1	1	1
15	VIS DOAS, PMD 2	423,97	526,96	3	1	1	1
16		527,20	544,56	3	1	1	1
17	AE	544,80	565,08	3	1	1	1
18		565,31	597,28	3	1	1	1
19	overlap region	597,52	605,48	3	1	1	1
20	Blinded Pixel	627,41	628,40	3	1	1	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	1	0,125	0,125
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	1	0,125	0,125
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	1	0,125	0,125
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	1	0,125	0,125
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,125	1
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							326618

Summary of results N3

State						N3	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,125	1
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

Summary of results N4

State						N4	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,125	1
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

StateOpt3_ocr44_factor8.xls Summary

Summary of results N5

State						N5	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,5	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,5	0,5
6	Blinded Pixel	333,92	334,37	1b	2	0,5	1
7	Blinded Pixel	412,18	411,74	2b	2	0,5	1
8	overlap region 2b	403,96	391,87	2b	2	0,5	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,5	0,5
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,5	0,5
11	Blinded Pixel	301,06	300,59	2a	2	0,5	1
12	Blinded Pixel	383,56	385,84	3	8	0,125	1
13	overlap region	391,88	404,10	3	8	0,125	1
14		404,34	423,73	3	1	0,125	0,125
15	VIS DOAS, PMD 2	423,97	526,96	3	1	0,125	0,125
16		527,20	544,56	3	8	0,125	1
17	AE	544,80	565,08	3	1	0,125	0,125
18		565,31	597,28	3	8	0,125	1
19	overlap region	597,52	605,48	3	8	0,125	1
20	Blinded Pixel	627,41	628,40	3	8	0,125	1
21	Blinded Pixel	595,36	596,26	4	8	0,125	1
22	overlap region	597,60	605,43	4	8	0,125	1
23		605,65	612,53	4	8	0,125	1
24	PMD 3, AE	612,75	725,99	4	1	0,125	0,125
25		726,19	753,77	4	8	0,125	1
26	O2(A)	753,98	775,92	4	1	0,125	0,125
27	overlap region	776,13	789,85	4	8	0,125	1
28	Blinded Pixel	811,47	812,33	4	8	0,125	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	1	0,25	0,25
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	2	0,125	0,25
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	1	1	1
49		1939,99	1967,79	7	1	1	1
50	CO2	1967,90	1984,05	7	1	1	1
51		1984,15	2029,89	7	1	1	1
52	CO2, H2O	2029,99	2040,19	7	1	1	1
53	Blinded Pixel	2042,80	2043,67	7	1	1	1
54	Blinded Pixel	2259,26	2260,47	8	8	0,125	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,125	1
56	Blinded Pixel	2384,60	2385,61	8	8	0,125	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390330

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	16	0,0625	1
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	16	0,0625	1
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	4	0,25	1
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	8	0,125	1
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	8	0,125	1
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	8	0,125	1
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	8	0,125	1
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	2	0,5	1
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	2	0,5	1
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	16	0,0625	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,0625	0,5
56	Blinded Pixel	2384,60	2385,61	8	16	0,0625	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							373178

StateOpt3_ocr44_factor8.xls Summary

Summary of results N7

State						N7	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	16	0,0625	1
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	16	0,0625	1
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	4	0,125	0,5
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	2	0,5	1
49		1939,99	1967,79	7	2	0,5	1
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	2	0,5	1
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	2	0,5	1
54	Blinded Pixel	2259,26	2260,47	8	16	0,0625	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	8	0,0625	0,5
56	Blinded Pixel	2384,60	2385,61	8	16	0,0625	1
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							380429

Summary of results L1

State						L1	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	2	0,75	1,5
8	unused pixel	411,63	404,07	2b	1	0,75	0,75
9	virtual channel 2b	403,96	320,14	2b	1	0,75	0,75
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	1	0,375	0,375
14	unused pixel	386,09	391,63	3	1	0,375	0,375
15	Channel 3 (main part)	391,88	605,48	3	1	0,375	0,375
16	unused pixel	605,72	627,17	3	1	0,375	0,375
17	Blinded Pixel	627,41	628,40	3	1	0,375	0,375
18	Blinded Pixel	595,36	596,26	4	1	0,375	0,375
19	unused pixel	596,48	597,38	4	1	0,375	0,375
20	Channel 4 (main part)	597,60	789,85	4	1	0,375	0,375
21	unused pixel	790,06	811,25	4	1	0,375	0,375
22	Blinded Pixel	811,47	812,33	4	1	0,375	0,375
23	Blinded Pixel	773,21	774,43	5	1	0,375	0,375
24	unused pixel	774,73	775,94	5	1	0,375	0,375
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	1	0,375	0,375
27	Blinded Pixel	1061,68	1062,83	5	1	0,375	0,375
28	Blinded Pixel	971,46	978,74	6	1	0,375	0,375
29	unused pixel	979,55	990,03	6	1	0,375	0,375
30	Channel 6/6+ (main part)	990,84	1750,09	6	1	0,375	0,375
31	unused pixel	1750,92	1764,24	6	1	0,375	0,375
32	Blinded Pixel	1765,07	1772,59	6	1	0,375	0,375
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	12	0,125	1,5
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							255348

Summary of results							L2
State						L2	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	2	0,75	1,5
8	unused pixel	411,63	404,07	2b	1	0,75	0,75
9	virtual channel 2b	403,96	320,14	2b	1	0,75	0,75
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel	627,41	628,40	3	24	0,0625	1,5
18	Blinded Pixel	595,36	596,26	4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel	811,47	812,33	4	24	0,0625	1,5
23	Blinded Pixel	773,21	774,43	5	8	0,1875	1,5
24	unused pixel	774,73	775,94	5	8	0,1875	1,5
25	Channel 5 (main part)	776,24	1056,25	5	2	0,1875	0,375
26	unused pixel	1056,53	1061,40	5	8	0,1875	1,5
27	Blinded Pixel	1061,68	1062,83	5	8	0,1875	1,5
28	Blinded Pixel	971,46	978,74	6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel	1765,07	1772,59	6	24	0,0625	1,5
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	12	0,125	1,5
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							324660

Summary of results L3

State						L3	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	24	0,0625	1,5
14	unused pixel	386,09	391,63	3	24	0,0625	1,5
15	Channel 3 (main part)	391,88	605,48	3	6	0,0625	0,375
16	unused pixel	605,72	627,17	3	24	0,0625	1,5
17	Blinded Pixel	627,41	628,40	3	24	0,0625	1,5
18	Blinded Pixel	595,36	596,26	4	24	0,0625	1,5
19	unused pixel	596,48	597,38	4	24	0,0625	1,5
20	Channel 4 (main part)	597,60	789,85	4	6	0,0625	0,375
21	unused pixel	790,06	811,25	4	24	0,0625	1,5
22	Blinded Pixel	811,47	812,33	4	24	0,0625	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	24	0,0625	1,5
29	unused pixel	979,55	990,03	6	24	0,0625	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	6	0,0625	0,375
31	unused pixel	1750,92	1764,24	6	24	0,0625	1,5
32	Blinded Pixel	1765,07	1772,59	6	24	0,0625	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	24	0,0625	1,5
39	Channel 8	2260,61	2384,49	8	6	0,0625	0,375
40	Blinded Pixel	2384,60	2385,61	8	24	0,0625	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

StateOpt3_ocr44_factor8.xls Summary

Summary of results L4

State						L4	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel	627,41	628,40	3	8	0,1875	1,5
18	Blinded Pixel	595,36	596,26	4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel	811,47	812,33	4	8	0,1875	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel	1765,07	1772,59	6	8	0,1875	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	24	0,0625	1,5
39	Channel 8	2260,61	2384,49	8	6	0,0625	0,375
40	Blinded Pixel	2384,60	2385,61	8	24	0,0625	1,5
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

Summary of results L5

State						L5	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	2	0,375	0,75
5	unused pixel	314,03	333,80	1b	4	0,375	1,5
6	Blinded Pixel	333,92	334,37	1b	4	0,375	1,5
7	Blinded Pixel	412,18	411,74	2b	4	0,375	1,5
8	unused pixel	411,63	404,07	2b	4	0,375	1,5
9	virtual channel 2b	403,96	320,14	2b	1	0,375	0,375
10	virtual channel 2a	320,02	309,43	2a	1	0,375	0,375
11	unused pixel	309,31	301,18	2a	4	0,375	1,5
12	Blinded Pixel	301,06	300,59	2a	4	0,375	1,5
13	Blinded Pixel	383,56	385,84	3	8	0,1875	1,5
14	unused pixel	386,09	391,63	3	8	0,1875	1,5
15	Channel 3 (main part)	391,88	605,48	3	2	0,1875	0,375
16	unused pixel	605,72	627,17	3	8	0,1875	1,5
17	Blinded Pixel	627,41	628,40	3	8	0,1875	1,5
18	Blinded Pixel	595,36	596,26	4	8	0,1875	1,5
19	unused pixel	596,48	597,38	4	8	0,1875	1,5
20	Channel 4 (main part)	597,60	789,85	4	2	0,1875	0,375
21	unused pixel	790,06	811,25	4	8	0,1875	1,5
22	Blinded Pixel	811,47	812,33	4	8	0,1875	1,5
23	Blinded Pixel	773,21	774,43	5	4	0,375	1,5
24	unused pixel	774,73	775,94	5	4	0,375	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	0,375	0,375
26	unused pixel	1056,53	1061,40	5	4	0,375	1,5
27	Blinded Pixel	1061,68	1062,83	5	4	0,375	1,5
28	Blinded Pixel	971,46	978,74	6	8	0,1875	1,5
29	unused pixel	979,55	990,03	6	8	0,1875	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	2	0,1875	0,375
31	unused pixel	1750,92	1764,24	6	8	0,1875	1,5
32	Blinded Pixel	1765,07	1772,59	6	8	0,1875	1,5
33	Blinded Pixel	1934,38	1935,44	7	4	0,375	1,5
34	unused pixel	1935,55	1939,88	7	4	0,375	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	4	0,375	1,5
36	unused pixel	2040,29	2042,70	7	4	0,375	1,5
37	Blinded Pixel	2042,80	2043,67	7	4	0,375	1,5
38	Blinded Pixel	2259,26	2260,47	8	24	0,0625	1,5
39	Channel 8	2260,61	2384,49	8	6	0,0625	0,375
40	Blinded Pixel	2384,60	2385,61	8	24	0,0625	1,5
41							
42							
43							
44							
45							
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60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							384906

Summary of results L6

State						L6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1,5	1,5
2	straylight	213,29	239,88	1a	1	1,5	1,5
3	virtual channel 1a	240,00	281,90	1a	1	1,5	1,5
4	virtual channel 1b	282,01	313,92	1b	1	1,5	1,5
5	unused pixel	314,03	333,80	1b	1	1,5	1,5
6	Blinded Pixel	333,92	334,37	1b	1	1,5	1,5
7	Blinded Pixel	412,18	411,74	2b	1	1,5	1,5
8	unused pixel	411,63	404,07	2b	1	1,5	1,5
9	virtual channel 2b	403,96	320,14	2b	1	1,5	1,5
10	virtual channel 2a	320,02	309,43	2a	1	1,5	1,5
11	unused pixel	309,31	301,18	2a	1	1,5	1,5
12	Blinded Pixel	301,06	300,59	2a	1	1,5	1,5
13	Blinded Pixel	383,56	385,84	3	1	0,75	0,75
14	unused pixel	386,09	391,63	3	1	0,75	0,75
15	Channel 3 (main part)	391,88	605,48	3	1	0,75	0,75
16	unused pixel	605,72	627,17	3	1	0,75	0,75
17	Blinded Pixel	627,41	628,40	3	1	0,75	0,75
18	Blinded Pixel	595,36	596,26	4	1	0,75	0,75
19	unused pixel	596,48	597,38	4	1	0,75	0,75
20	Channel 4 (main part)	597,60	789,85	4	1	0,75	0,75
21	unused pixel	790,06	811,25	4	1	0,75	0,75
22	Blinded Pixel	811,47	812,33	4	1	0,75	0,75
23	Blinded Pixel	773,21	774,43	5	1	1,5	1,5
24	unused pixel	774,73	775,94	5	1	1,5	1,5
25	Channel 5 (main part)	776,24	1056,25	5	1	1,5	1,5
26	unused pixel	1056,53	1061,40	5	1	1,5	1,5
27	Blinded Pixel	1061,68	1062,83	5	1	1,5	1,5
28	Blinded Pixel	971,46	978,74	6	1	1,5	1,5
29	unused pixel	979,55	990,03	6	1	1,5	1,5
30	Channel 6/6+ (main part)	990,84	1750,09	6	1	1,5	1,5
31	unused pixel	1750,92	1764,24	6	1	1,5	1,5
32	Blinded Pixel	1765,07	1772,59	6	1	1,5	1,5
33	Blinded Pixel	1934,38	1935,44	7	1	1,5	1,5
34	unused pixel	1935,55	1939,88	7	1	1,5	1,5
35	Channel 7 (main part)	1939,99	2040,19	7	1	1,5	1,5
36	unused pixel	2040,29	2042,70	7	1	1,5	1,5
37	Blinded Pixel	2042,80	2043,67	7	1	1,5	1,5
38	Blinded Pixel	2259,26	2260,47	8	12	0,125	1,5
39	Channel 8	2260,61	2384,49	8	12	0,125	1,5
40	Blinded Pixel	2384,60	2385,61	8	12	0,125	1,5
41							
42							
43							
44							
45							
46							
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53							
54							
55							
56							
57							
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59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							132554

Annex 5: Modified entries in PET and co-adding tables required for OCR_44 implementation.

PET table: PET reduction by factor 8:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Nadir 01	1	Low	1,	,5	,5	,5	1,	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 02	2	Low	1,	,5	,5	,5	1,	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 03	3	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 04	4	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 05	5	Low	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 06	6	Low	1,	,25	,25	,25	,0625	,0625	,25	,125	,5	,0625	changed due to OCR_44
Nadir 07	7	Low	1,	,25	,25	,25	,0625	,0625	,125	,125	,5	,0625	changed due to OCR_44
Dark_Current_Cal_5	8	Low	,25	,25	,25	,25	1,	1,	,25	,5	,125	,125	changed due to OCR_007&OCR_43
Dark_Current_Cal_4	26	Low	1,	1,	1,5	1,5	,75	,75	1,5	1,5	,5	,5	changed due to OCR_43
Limb 01	28	Low	1,5	1,5	,75	1,5	,375	,375	,375	,375	1,5	,125	changed due to OCR_44
Limb 02	29	Low	1,5	1,5	,75	1,5	,0625	,0625	,1875	,0625	1,5	,125	changed due to OCR_44
Limb 03	30	Low	1,5	,375	,375	,375	,0625	,0625	,375	,0625	,375	,0625	changed due to OCR_44
Limb 04	31	Low	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,0625	changed due to OCR_44
Limb 05	32	Low	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,0625	changed due to OCR_44
Limb 06	33	Low	1,5	1,5	1,5	1,5	,75	,75	1,5	1,5	1,5	,125	changed due to OCR_44
Dark_Current_Cal_1	46	Low	,0625	,0625	,0625	,0625	,0625	,0625	,125	,0625	,0625	,0625	changed due to OCR_43
Dark_Current_Cal_2	63	Low	,375	,375	,75	,75	,375	,375	,375	,375	,375	,375	changed due to OCR_43
Dark_Current_Cal_3	67	Low	,5	,5	,5	,5	,125	,125	,5	,125	1,	1,	changed due to OCR_007&OCR_43

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
Nadir 01	1	High	1,	,5	,5	,5	1,	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 02	2	High	1,	,5	,5	,5	1,	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 03	3	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 04	4	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 05	5	High	1,	,5	,5	,5	,125	,125	,25	,125	1,	,125	changed due to OCR_44
Nadir 06	6	High	1,	,25	,25	,25	,0625	,0625	,25	,125	,5	,0625	changed due to OCR_44
Nadir 07	7	High	1,	,25	,25	,25	,0625	,0625	,125	,125	,5	,0625	changed due to OCR_44
Dark_Current_Cal_5	8	High	,25	,25	,25	,25	1,	1,	,25	,5	,125	,125	changed due to OCR_007&OCR_43
Dark_Current_Cal_4	26	High	1,	1,	1,5	1,5	,75	,75	1,5	1,5	,5	,5	changed due to OCR_43
Limb 01	28	High	1,5	1,5	,75	1,5	,375	,375	,375	,375	1,5	,125	changed due to OCR_44
Limb 02	29	High	1,5	1,5	,75	1,5	,0625	,0625	,1875	,0625	1,5	,125	changed due to OCR_44
Limb 03	30	High	1,5	,375	,375	,375	,0625	,0625	,375	,0625	,375	,0625	changed due to OCR_44
Limb 04	31	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,0625	changed due to OCR_44
Limb 05	32	High	1,5	,375	,375	,375	,1875	,1875	,375	,1875	,375	,0625	changed due to OCR_44
Limb 06	33	High	1,5	1,5	1,5	1,5	,75	,75	1,5	1,5	1,5	,125	changed due to OCR_44
Dark_Current_Cal_1	46	High	,0625	,0625	,0625	,0625	,0625	,0625	,125	,0625	,0625	,0625	changed due to OCR_43
Dark_Current_Cal_2	63	High	,375	,375	,75	,75	,375	,375	,375	,375	,375	,375	changed due to OCR_43
Dark_Current_Cal_3	67	High	,5	,5	,5	,5	,125	,125	,5	,125	1,	1,	changed due to OCR_007&OCR_43

Co-adding table for PET reduction by factor 8:

Output 2 CTI								
CO_ADDING	1							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	2	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	12	12	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	2							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	2	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	24	24	6	24
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	24	24	24	6	24	24	8	8
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	2	8	8	24	24	6	24	24
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	12	12	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	3							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	24	24	6	24
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	24	24	24	6	24	24	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	24	24	6	24	24
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	24	6	24
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64

Output 2 CTI								
CO_ADDING	4							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	8	8	2	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	2	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	8	8	2	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	24	6	24
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	5							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	2	4	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	4	8	8	2	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	2	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	4	4	8	8	2	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	24	6	24
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	6							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	12	12	12
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI								
CO_ADDING	21							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	8	8	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	22							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	1	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	1	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	1	8	1	8	1	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	8	8	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0
CO_ADDING	23							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	8	8	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

CO_ADDING	24							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	8	8	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	25							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	2	8	8	1	1	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	8	8	8	8	8	8	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	8	1	8	8	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	1	4	8	2	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	1
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	1	1	1	1	1	8	8	8
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	26							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	4	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	16	16	16	4	16
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	16	16	16	16	16	16	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	16	4	16	16	4	4	4	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	8	8	8	8	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	8	8	8	8	8	8	8	2
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	2	2	2	2	2	16	8	16
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

CO_ADDING	27							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	5	1	1	2	1	20	4	4
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	4	16	16	16	4	16
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	16	16	16	16	16	16	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	16	4	16	16	8	8	8	4
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	8	8	8	8	8	8	2	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	2	8	2	8	2	8	8	2
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	2	1	2	1	2	16	8	16
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	45							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	8	8	8	8	8	8	8	8
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	8	8	8	8	8	8	4	4
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	4	4	4	8	8	8	8	8
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	16	16	16	16	16	8	8	8
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

CO_ADDING	49							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	2	2	2	2	2	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Output 2 CTI

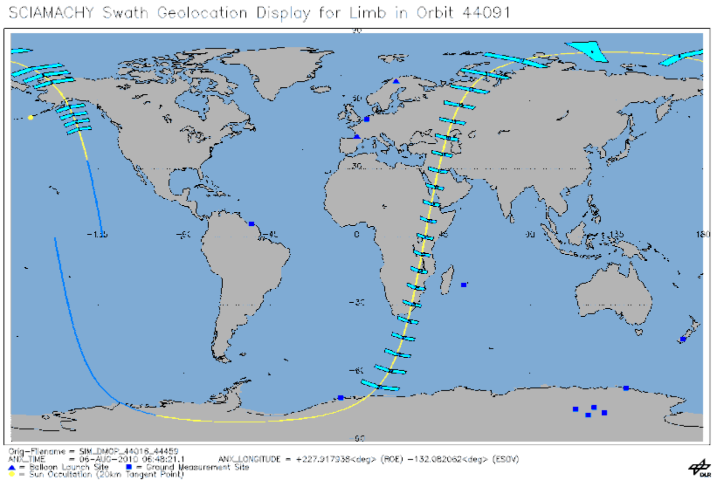
CO_ADDING	50							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	4	4	4	4
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	4	4	4	4	4	4	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	2	2	2	2	2
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

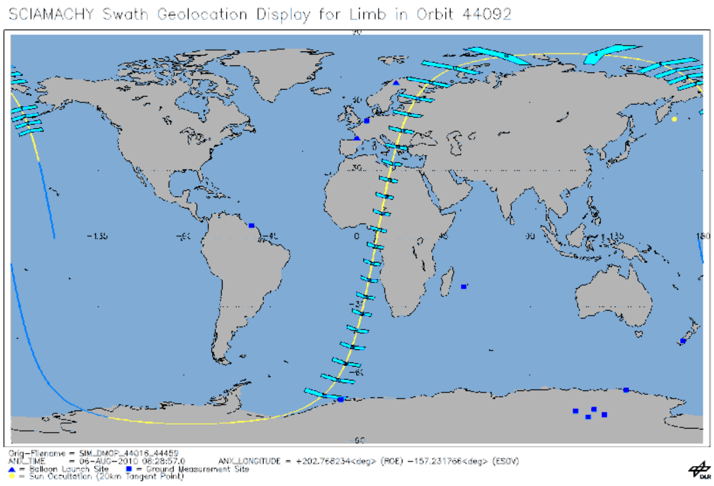
CO_ADDING	51							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	1	1	1	1	2	2	2	2
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	2	2	2	2	2	2	1	1
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	1	1	1	1	1	1	1	1
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

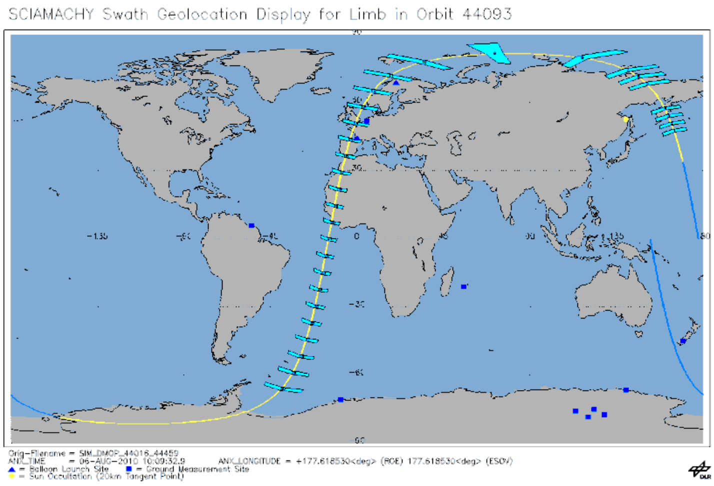
CO_ADDING	52							
Cluster Index	1	2	3	4	5	6	7	8
Co_Adding Factor	2	2	2	2	2	2	2	2
Cluster Index	9	10	11	12	13	14	15	16
Co_Adding Factor	2	2	2	2	1	1	1	1
Cluster Index	17	18	19	20	21	22	23	24
Co_Adding Factor	1	1	1	1	1	1	2	2
Cluster Index	25	26	27	28	29	30	31	32
Co_Adding Factor	2	2	2	1	1	1	1	1
Cluster Index	33	34	35	36	37	38	39	40
Co_Adding Factor	4	4	4	4	4	4	4	4
Cluster Index	41	42	43	44	45	46	47	48
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	49	50	51	52	53	54	55	56
Co_Adding Factor	0	0	0	0	0	0	0	0
Cluster Index	57	58	59	60	61	62	63	64
Co_Adding Factor	0	0	0	0	0	0	0	0

Annex 6: ENVISAT ground track in selected orbits

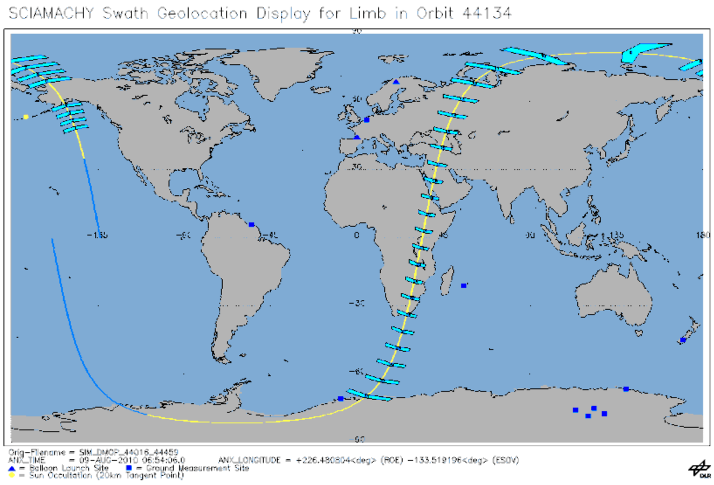
PET reduced by factor 4 on 6th August 2010

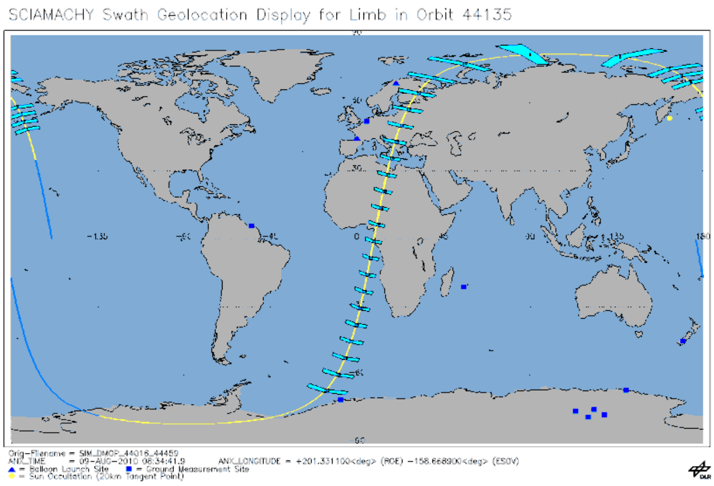


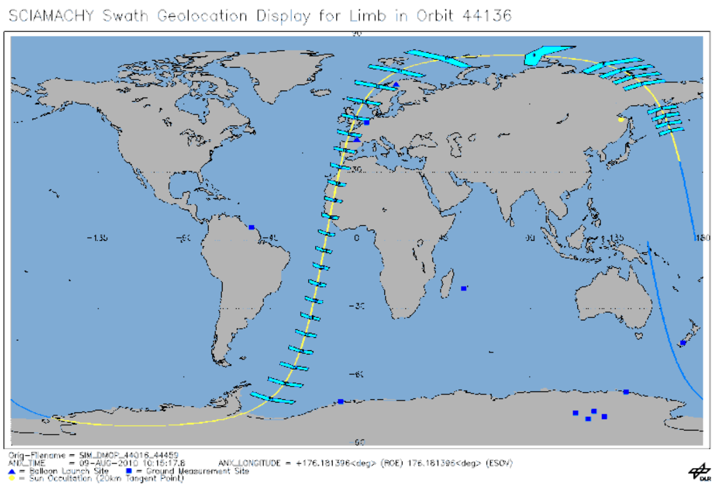




PET reduced by factor 8 on 9th August 2010







OCR_45: Extended Moon Observations (Repeat)

SCIAMACHY	**Operation Change Request**	OCR No: 45
		Issue:

Title: Extended Moon Observations (Repeat)

Description of Request:

Repeat of OCR_25 (Extended Moon observations) in order to characterise ongoing ASM and ESM mirror degradation.

OCR_25 was extremely helpful in determining the baseline limb radiometric calibration, which revealed both an offset with respect to nadir reflectance calibration, and confirmed many of the spectral features already observed in nadir radiometric validation (see figure 1).

The lunar calibration results were essential in providing direction for further investigations into calibration key data improvement. Figure 2 shows preliminary results for the new radiometric calibration, where the ratio with a scaled lunar spectrum is shown for the old (blue) and the new (black) key data. The reduction in spectral features is obvious, and is visible due to the fact that the spectral features of the Moon are smooth, typically several hundreds of nm wide.

There are many additional uses for the lunar observations, among which a means to validate aspects of the new scanner model used in the new calibration key data. The new scanner model allows contamination of the mirror and diffuser surfaces, an aspect which has not yet been investigated in detail.

The proposed repeat of the OCR _25 measurements serves the following purposes:

- Allow investigation of in particular ASM mirror degradation (as observed in the UV after the most recent decontamination). The lunar measurements cover the full azimuth field of view and should be able to distinguish ASM scan angle dependent degradation.
- Serve as an additional well-defined point in time for radiometric calibration, in combination with the on-ground calibration and OCR_25.
- In combination with OCR_25, serve as a basis for radiometric degradation over time, in particular for the limb viewing geometry.
- In contrast to solar and WLS monitoring, the lunar measurements can be used to determine reflectance degradation of the instrument.

The OCR could be implemented similar to OCR_25, with possible modification that the scan range in elevation direction could be optimised to cover more of the elevation range in the top part of the limb total clear field of view. The azimuth range should cover the limb total clear field of view, the elevation range from approximately the top of atmosphere to the maximum elevation allowed by the limb total clear field of view. Additional coverage of the lower elevation ranges are not necessary, but are not a problem either.

The OCR shall not affect nominal lunar occultation measurements. Note that for this OCR only the part above the atmosphere is of interest. Figure 3 shows the coverage as obtained by OCR_25.

Figure 1

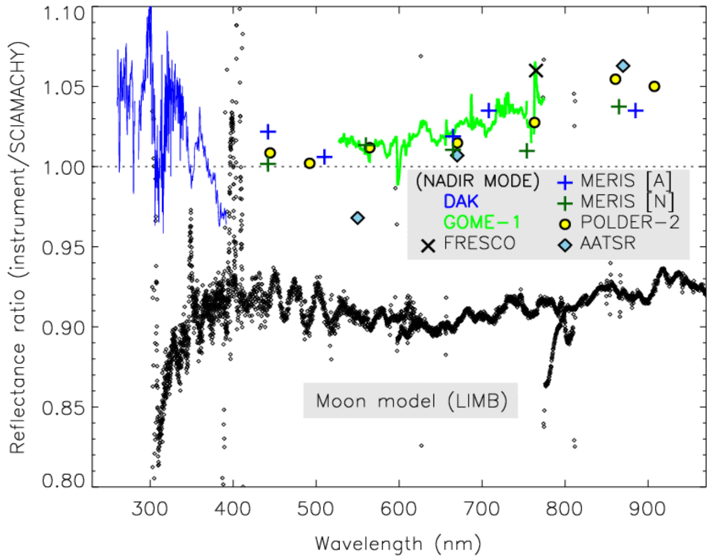


Figure 2

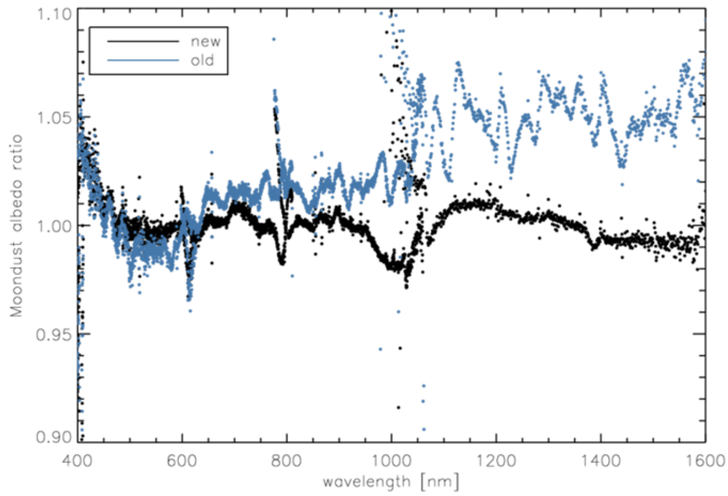
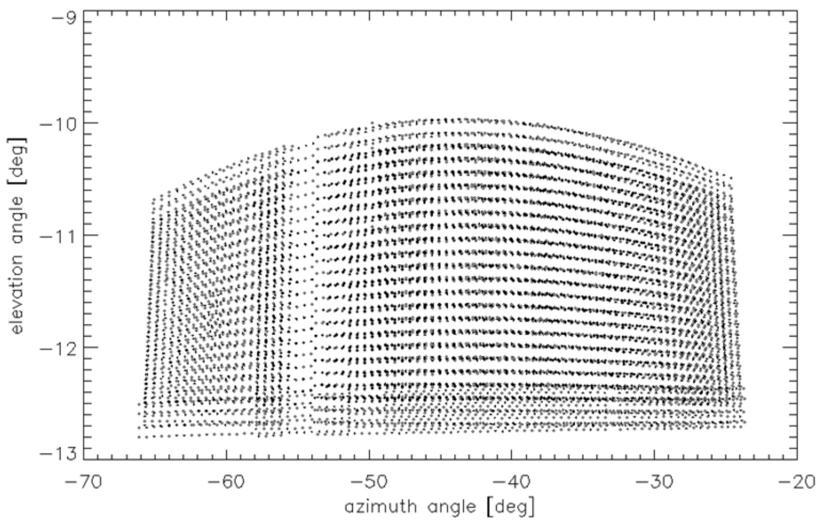


Figure 3



Originator: Ralph Snel	Date of Issue: 2010-05-19	Signature: RS
Assessment of SSAG (necessary for requests by scientists): As explained in the justification above, the proposed lunar measurements are of great value to constrain SCIAMACHY radiometric calibration and degradation correction, both relevant for a mission in its best age. Implementation is therefore recommended. Ideally the OCR will be executed before the orbit change.		
SSAG: H. Bovensmann	Date: 19.5.2010	Signature: e-mail 19.5.2010
Classification of OCR:		
OCR Analysis (incl. Implementation Option): OCR_45 is implemented as a test campaign similarly to the original implementation of OCR_25. The only difference is that the measurement duration is extended by 28 sec giving an additional coverage of 1.25° in elevation. The implementation requires definition of a test state and of a test timeline. State: It is planned to modify state 54 such that it can start as early as possible and end as late as possible in the MO&C window. Currently state 54 has a duration of 15.57 sec with a SDPU duration (measurement phase) of 12 sec. The nominal scan width amounts to ±0.33° with a scan duration of 2 sec. The modified state 54 begins to scan the lunar disk at an altitude of 100 km and ends scanning 120 sec later close to the upper edge of the limb TCFoV. Scanning parameters are as in the OCR_25 measurements. Only scanner state table no. 54 and state duration table need modifications The 2 CTI-tables are shown below: Timeline: In timeline set 9 a timeline 13 is defined which executes state 54 modified as described above. Timeline header information (moon fixed event) will be defined accordingly. In order not to produce an idle gap before moon scanning, another test timeline 42 is implemented executing a single nadir state. Envisaged execution of the measurements is in the monthly visibility period between 18th-23rd August (orbit 44273-44339). After orbit 44339 moon occultations on the nightside are scheduled. A second period with extended moon observations is possible between 17th-22nd September provided it does not hamper preparations for the ENVISAT orbit modifications.		
SOST: M. Gottwald, E. Krieg (ESA, Industry if necessary)	Date: 01-06-2010	Signature: via e-mail 01-06-2010
Approval of Proposed Implementation:		
Originator Approval: Ralph Snel, SRON	Date: 07-06-2010	Signature: via e-mail 07-06-2010
SSAG Approval: H. Bovensmann, IUP-IFE	Date: 07-06-2010	Signature: via e-mail 07-06-2010
Decision / Approval: Shall be implemented as proposed. ESA confirmed (T. Fehr, e-mail 09-06-2010) that this OCR does not interfere with preparations for ENVISAT orbit manoeuvre in October.		

DLR Approval: A. Friker, DLR (if necessary NIVR, SPEC)	Date: 09-06-2010	Signature: via e-mail 09-06-2010
Implementation by SOST: OCR_45 will be executed in a first observation window starting 19th August from orbit 44273 to 44340. Moon occultations on nightside observations follow from orbit 44341 incl. 44357 with configuring SCIAMACHY back to nominal (state ID 54 and timeline 13 of set 35). On 24th August in orbit 44358 the modified parameters (state ID 54) and timelines (13 and 42 of set 09) for OCR_45 are loaded again for the second observation window extending to orbit 44368 included.		
SOST: M. Gottwald, E. Krieg	Date: 25-06-2010	Signature: via e-mail 25-06-2010

Annex: Modified parameter tables and timelines

Scanner State table:

Scanner State Parameter #54	54	Moon_Cal_Scan			new due to OCR_045				
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	54								
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	002								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	4								
Duration of Phase [msec]		1300,0	2000,0	118000,0	1020,0	0,0	0,0	0,0	0,0
Phase Type		0	1	1	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		5	5	7	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		5	5	5	0	0	0	0	0
H/W constellation		3	3	3	3	0	0	0	0
Azimuth Basic Scan Profile Identifier		5	5	5	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	0	4	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	1	0	0	0	0	0
Elevation Correction of nominal Scan Profile		5	5	9	0	0	0	0	0
Elevation Relative Scan Profile Identifier		5	5	4	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		3	3	3	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	0	58	0	0	0	0	0

State Duration table:

CTI State Name	Output 2 CTI			Configuration 1				
	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait	
Moon_Cal_scan_extented-duration	54	255	STANDARD	1920	30696	31637	179	changed duration (new state design) due to OCR_045

Moon extended observation (ID 54) timing inputs for timeline generation

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup (inc. WSR)	281 cts (762-636-24 +179) (see rts-state-duration_01_03_06.xls)
total RTCS-duration	762 cts
WME	30696 cts (120×16×16-24) (see rts-state-duration_01_03_06.xls)
WSR	179 cts
total state duration	31637 cts (762+30696+179)

set-up	636 cts
cleanup	281 cts
measurement	30720 cts (120×16×16)
total state duration	31637 cts
SDPU duration	1920 bcps

phase 1	1300 msec
phase 2	2000 msec
phase 3	118000 msec
phase 4	1020 msec

TL-Timing for Moon extended observation (ID 54)

TL 13

TL set_up	709 cts
Total state 54 duration	31637 cts
TL_close_up	24 cts
total TL_duration	32370 cts

TL padding = 1s	256 cts
planning gap= 0,1s	26 cts

next TL START

tl_09_13_02.xls Special Measurement/OCR045

H:\scia\timing\timeline_set_09\tl_09_13_02.xls		MOC_100_MOC_end_moon_ns		Table start ID =	769	Event_type =	m_06
DURATION <s>=	127,44531250	DTX0 <s>=	5,25390625	DTX1 <s>=	0,00000000	DTX2 <s>=	121,02000000
SCHED_TYPE =	MF_FI	GEO_TYPE =	tangent_height	GEO_NUM <km>=	100,00	FOV_CHECK =	YES
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	54	mos01	709	2,77	2,77	123,58	126,35
2	End of Timeline	End of Timeline	31637	123,58			
3	End of Timeline	End of Timeline	0				
4	End of Timeline	End of Timeline	0				
5	End of Timeline	End of Timeline	0				
6	End of Timeline	End of Timeline	0				
7	End of Timeline	End of Timeline	0				
8	End of Timeline	End of Timeline	0				
9	End of Timeline	End of Timeline	0				
10	End of Timeline	End of Timeline	0				
11	End of Timeline	End of Timeline	0				
12	End of Timeline	End of Timeline	0				
13	End of Timeline	End of Timeline	0				
14	End of Timeline	End of Timeline	0				
15	End of Timeline	End of Timeline	0				
16	End of Timeline	End of Timeline	0				
17	End of Timeline	End of Timeline	0				
18	End of Timeline	End of Timeline	0				
19	End of Timeline	End of Timeline	0				
20	End of Timeline	End of Timeline	0				
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27	End of Timeline	End of Timeline	0				
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29	End of Timeline	End of Timeline	0				
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31	End of Timeline	End of Timeline	0				
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39	End of Timeline	End of Timeline	0				
40	End of Timeline	End of Timeline	0				
41	End of Timeline	End of Timeline	0				
42	End of Timeline	End of Timeline	0				
43	End of Timeline	End of Timeline	0				
44	End of Timeline	End of Timeline	0				
45	End of Timeline	End of Timeline	0				
46	End of Timeline	End of Timeline	0				
47	End of Timeline	End of Timeline	0				
48	End of Timeline	End of Timeline	0				
49	End of Timeline	End of Timeline	0				
50	End of Timeline	End of Timeline	0				
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52	End of Timeline	End of Timeline	0				
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55	End of Timeline	End of Timeline	0				
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57	End of Timeline	End of Timeline	0				
58	End of Timeline	End of Timeline	0				
59	End of Timeline	End of Timeline	0				
60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	32346		126,35	0,09	126,45

Table 3: Timeline 13 (t/l set 09, sub_ID 02)

tl_09_42_02.xls

Special Measurement/OCR045

H:\scia\timing\timeline_set_09\tl_09_42_02.xls		MOC_start_MOC_100_nadir		Table start ID =	2625	Event_type =	n/a
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SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	**State ID**	**State Description**	**State TT (relative, ct)**	**State TT (relative, sec)**	**Start Time (absolute, sec) T1 +**	**State Duration (sec)**	**End Time (absolute, sec) T1 +**
		T/L setup			0	2,77	
1	6	nad06	709	2,77	2,77	68,56	71,33
2	End of Timeline	End of Timeline	17551	68,56			
3	End of Timeline	End of Timeline	0				
4	End of Timeline	End of Timeline	0				
5	End of Timeline	End of Timeline	0				
6	End of Timeline	End of Timeline	0				
7	End of Timeline	End of Timeline	0				
8	End of Timeline	End of Timeline	0				
9	End of Timeline	End of Timeline	0				
10	End of Timeline	End of Timeline	0				
11	End of Timeline	End of Timeline	0				
12	End of Timeline	End of Timeline	0				
13	End of Timeline	End of Timeline	0				
14	End of Timeline	End of Timeline	0				
15	End of Timeline	End of Timeline	0				
16	End of Timeline	End of Timeline	0				
17	End of Timeline	End of Timeline	0				
18	End of Timeline	End of Timeline	0				
19	End of Timeline	End of Timeline	0				
20	End of Timeline	End of Timeline	0				
21	End of Timeline	End of Timeline	0				
22	End of Timeline	End of Timeline	0				
23	End of Timeline	End of Timeline	0				
24	End of Timeline	End of Timeline	0				
25	End of Timeline	End of Timeline	0				
26	End of Timeline	End of Timeline	0				
27	End of Timeline	End of Timeline	0				
28	End of Timeline	End of Timeline	0				
29	End of Timeline	End of Timeline	0				
30	End of Timeline	End of Timeline	0				
31	End of Timeline	End of Timeline	0				
32	End of Timeline	End of Timeline	0				
33	End of Timeline	End of Timeline	0				
34	End of Timeline	End of Timeline	0				
35	End of Timeline	End of Timeline	0				
36	End of Timeline	End of Timeline	0				
37	End of Timeline	End of Timeline	0				
38	End of Timeline	End of Timeline	0				
39	End of Timeline	End of Timeline	0				
40	End of Timeline	End of Timeline	0				
41	End of Timeline	End of Timeline	0				
42	End of Timeline	End of Timeline	0				
43	End of Timeline	End of Timeline	0				
44	End of Timeline	End of Timeline	0				
45	End of Timeline	End of Timeline	0				
46	End of Timeline	End of Timeline	0				
47	End of Timeline	End of Timeline	0				
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55	End of Timeline	End of Timeline	0				
56	End of Timeline	End of Timeline	0				
57	End of Timeline	End of Timeline	0				
58	End of Timeline	End of Timeline	0				
59	End of Timeline	End of Timeline	0				
60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	18260		71,33	0,09	71,42

Table 4: Timeline 42 (t/l set 09, sub_ID 02)

OCR_46: Changing Integration Time for Cluster 16 an 18 (channel 3) to 0.25 or Shorter – Starting as Soon as Possible from 12 June 2010 Onwards

SCIAMACHY	Operation Change Request	OCR No: 46
		Issue:

Title: Changing Integration Time for Cluster 16 an 18 (channel 3) to 0.25 or Shorter – Starting as Soon as Possible from 12 June 2010 Onwards

Description of Request:

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32, OCR_35, OCR_39, OCR_41 and OCR_42 in 2007, 2008, 2009 and 2010. Results (see attached Figure 1) from analysing SCIA data clusters 9, 15, 16, 17, 18 from these OCR time periods with PhytoDOAS retrieval (see Bracher et al. 2009) show that by including in the analysis cluster 16-18 we can differentiate further the phytoplanktom group of cyanobacteria into Prochlorococcus and Synechococcus type cyanobacteria. This is possible because by having the same spatial resolution for clusters 16 and 18, we can use the entire data set from ~530 to 595 nm and resolve by this the phycoerythrine (a pigment which almost only appears in Synecho-coccus-type cyanobacteria) absorption within this wavelength range. In normal operation the integration time in clusters 16 and 18 is around 1, not enough to get highly spatially resolved results for further phytoplankton modelling approaches. With resolving the different types of cyanobacteria which have different functions within the marine food web and biogeochemical cycles, global phytoplankton biomass estimates and marine nutrient flux studies can be much improved. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups.

This OCR requires the modifications described above for the Arctic Atlantic Ocean campaign between 12 June and 31 July 2010 (on Research Vessel Polarstern, ARKXXV-1 and -2). It is sufficient to full-fill the above requirements for solar zenith angles smaller 70°.

Note: Since GOME-2 is degrading so fast that a data base for these phytoplankton groups can not be built up from today, we envisage to raise another OCR in the near future to permanently modify the particular integration times in channel 3.

Originator:Astrid Bracher	Date of Issue: 2010-06-07	Signature:A. Bracher by email 2010-06-07

Assessment of SSAG (necessary for requests by scientists):

The proposed OCR will allow to derive new information on phytoplankton groups, and the OCR is therefore recommended to be implemented.

SSAG: H. Bovensmann	Date: 7.6.2010	Signature: via e-mail, 7.6.2010

Classification of OCR:

OCR Analysis (incl. Implementation Option): The following analysis is identical to that of OCR_42 executed in April/May 2010. A reduction of the integration times below 0.25 s would have a major impact on the data products and is not considered to be feasible. Therefore the implementation concentrates on achieving an integration time of 0.25 s for clusters 9, 15, 16, 17 and 18. The OCR can be implemented by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 can be achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time. A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters. (Note: an integration time of 0.25 s corresponds to a spatial resolution of about 30km x 60 km, 1 s to about 30km x 240 km.) Increase integration times of "non-special" clusters in channel 7 (48, 49, 51, 53) and blinded pixels in channel 6 (36, 47) to 5 s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above. The implementation involves CTI-tables only and requires no particular scheduling of specific timelines.		
SOST: M. Gottwald/E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 07/06/2010	Signature: via e-mail 07/06/2010
Approval of Proposed Implementation:		
Originator Approval: Astrid Bracher	Date: 07/06/2010	Signature: via e-mail 07/06/2010
SSAG Approval: H. Bovensmann	Date: 7.6.2010	Signature: e-mail 7.6.2010
Decision / Approval: Shall be implemented as recommended.		
DLR Approval: Achim Friker (if necessary NIVR, SPEC)	Date: 07 June 2010	Signature: via E-Mail 07 June 2010
Implementation by SOST: Validity of the modified co-adding tables 26 and 27 will start in orbit 43306 (12th June 2010) at 10:40:00 UTC. Return to nominal operation will be effective from orbit 44016 (1st August 2010, about 01:06:00 UTC) onwards.		
SOST: M. Gottwald/E. Krieg, DLR-IMF	Date: 07/06/2010	Signature: via e-mail 07/06/2010

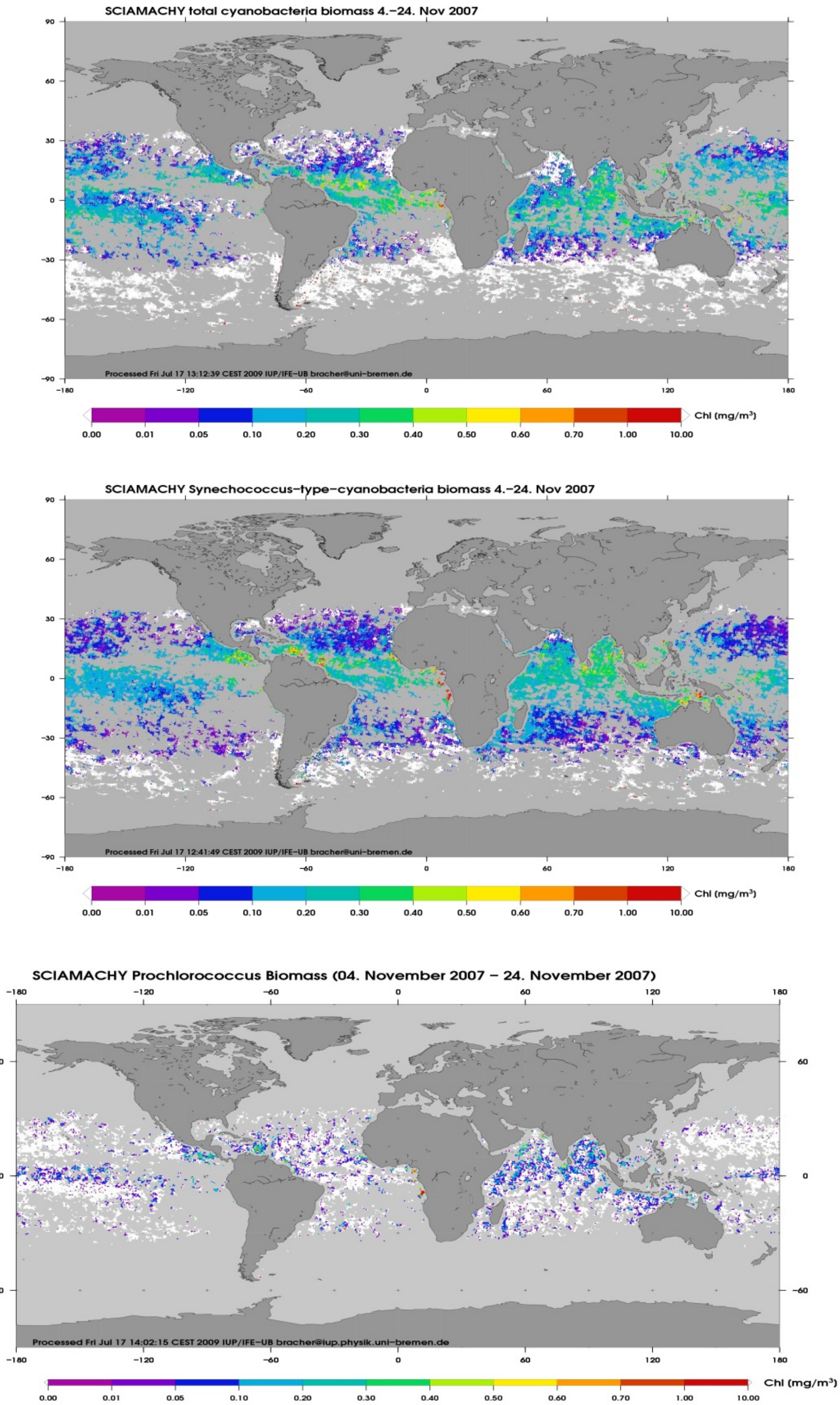


Figure 1: Mean global biomass (in chl-a conc.) of all cyanobacteria (upper panel), Synechococcus-type-cyanobacteria (middle panel) and Prochlorococcus (lower panel) in Nov 2007 (during OCR 32) determined by PhytoDOAS from SCIAMACHY data from Fits within the range of clusters 9, 15, 16, 17 and 18. White pixels signify no correlation with the absorption of the specific phytoplankton group spectrum and therefore SCIAMACHY pixels without any biomass of this group.

OCR_47: Changing Integration Time for Cluster 16 and 18 (Channel 3) for Permanent to 0.25 or Shorter – Starting Directly After OCR_46

	Operation Change Request	OCR No: 47 Issue: 3

Title: Changing Integration Time for Cluster 16 and 18 (Channel 3) for Permanent to 0.25 or Shorter – Starting Directly After OCR_46

Description of Request:

We wish a higher spatial resolution for clusters 16 and 18 (channel 3) with the same short integration time as for cluster 17 (0.25 or better) as it has been successfully applied for OCR_32, OCR_35, OCR_39, OCR_41, OCR_42 and OCR_46 in 2007, 2008, 2009 and 2010. Results (see previous OCR 42) from analysing SCIA data clusters 9, 15, 16, 17, 18 from these OCR time periods with PhytoDOAS retrieval (see Bracher et al. 2009) show that by including in the analysis cluster 16-18 we can differentiate further the phytoplankton group of cyanobacteria into Prochlorococcus and Synechococcus type cyanobacteria. This is possible because by having the same spatial resolution for clusters 16 and 18, we can use the entire data set from ~530 to 595 nm and resolve by this the phycoerythrine (a pigment which almost only appears in Synecho-coccus-type cyanobacteria) absorption within this wavelength range. In normal operation the integration time in clusters 16 and 18 is around 1, not enough to get highly spatially resolved results for further phytoplankton modelling approaches. With resolving the different types of cyanobacteria which have different functions within the marine food web and biogeochemical cycles, global phytoplankton biomass estimates and marine nutrient flux studies can be much improved. In addition also the integration times for cluster 9 (channel 2) and 15 (channel 3) should also not be larger than 0.25 because we need this information for calculating phytoplankton group concentrations from the DOAS-fits of phytoplankton and also for distinguishing other phytoplankton groups.

This OCR requires the modifications described above for a permanent implementation for SCIAMACHY because **GOME-2 is degrading so fast that a data base for these phytoplankton groups cannot be built up from this sensor using its current and future measurements.**

Originator: Astrid Bracher	Date of Issue: 2010-06-23	Signature: A. Bracher by email 2010-06-23

Assessment of SSAG (necessary for requests by scientists):

Colleagues from SSAG and DOAS retrieval experts have been consulted. Based on that consultations it can be stated, that the proposed change will not unacceptably restrict other scientific applications of SCIAMACHY data. Permanent implementation is therefore recommended from SSAG.

SSAG: H. Bovensmann	Date: 15.07.2010	Signature: via e-mail 15.07.2010

Classification of OCR: class D

OCR Analysis (incl. Implementation Option):

The following analysis is identical to that of OCR_46 executed in June/July 2010.
The OCR will be implemented in the same way as all the former OCR's mentioned above by modification of the co-adding tables for the nadir states N6 (state ID 6) and N7 (state ID 7). Reduction of the integration time for clusters 16 & 18 is achieved by reducing the co-adding factors for these clusters from 16 to 4, resulting in an integration time of 0.25 s. There is no need to modify co-addings for clusters 9, 15 & 17 for states N6 and N7 as these already have 0.25 s integration time.

A reduction of the co-adding factors results in an increase of the data rate above the allowed limit of about 390000 bits/s. To compensate for this it is necessary to increase the co-adding factors (and thus reducing spatial resolution) in other clusters (note: an integration time of 0.25 s corresponds to a spatial resolution of about 30km x 60 km, 1 s to about 30km x 240 km.).

Increase integration times of "non-special" clusters in channel 7 (48, 49, 51, 53) and blinded pixels in channel 6 (36, 47) to 5 s. Co-adding tables 26 and 27 will be modified accordingly (see annex 2). The co-addings for clusters 16 & 18 are set to 4 as described above.

The implementation involves CTI-tables only and requires no particular scheduling of specific timelines.

SOST: E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 19/07/2010	Signature: via e-mail 19/07/2010

Approval of Proposed Implementation:

Originator Approval: A. Bracher	Date: 1.8.2010	Signature: via e-mail 1.8.2010
SSAG Approval: H. Bovensmann	Date: 15.07.2010	Signature: via e-mail 15.07.2010

Decision / Approval:

Since the required changes do not restrict unacceptably other scientific applications permanent implementation of OCR_47 is recommended.

DLR Approval: A. Friker, DLR-BO (if necessary NIVR, SPEC)	Date: 15.07.2010	Signature: via e-mail 15.07.2010

Implementation by SOST:

Validity of the modified co-adding tables 26 and 27 will start in orbit 44145 (10th August 2010) at 01:24:00 UTC. This date is chosen for reasons of traceability in order to

- have a clear completion of OCR_44 (Co-adding tables 26 and 27 are involved) and
- also produce the updated CTI-LIB (daily update) on the day following completion of OCR_44.

This is a permanent implementation, i.e. the 2 CTI-files will define a new final flight configuration (FFS_100810). Both files will be included in the ERCORMS stack and be loaded for each restart of SCIAMACHY.

Note: Due to an anomaly in orbit 44134 (9th August 2010), modification of the co-adding tables was slightly delayed. It occurred in orbit 44151 (10th August 2010).

SOST M. Gottwald/E. Krieg, DLR-IMF	Date: 19.07.2010	Signature: via e-mail 19/07/2010

Annex:

Summary of results N6

State						N6	
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	1	1	1
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	1	0,25	0,25
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	4	0,25	1
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	4	0,25	1
30	overlap region	776,24	789,74	5	4	0,25	1
31		790,04	798,06	5	4	0,25	1
32	PMD 4/7, AE	798,35	946,62	5	1	0,25	0,25
33		946,90	990,40	5	4	0,25	1
34	overlap region, (AE)	990,68	1056,25	5	2	0,25	0,5
35	Blinded Pixel	1061,68	1062,83	5	4	0,25	1
36	Blinded Pixel	971,46	978,74	6	8	0,125	1
37	overlap region	990,84	1056,23	6	4	0,125	0,5
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	8	0,125	1
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	2	0,5	1
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	2	0,5	1
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							386333

Summary of results N7

State							N7
Cluster Ind.	Description	min/max wavelength , nm		Channel	Coadding	PET (s)	Int. Time(s)
1	Blinded Pixel	212,53	213,14	1a	5	1	5
2	straylight	213,29	239,88	1a	1	1	1
3	virtual channel 1a	240,00	281,90	1a	1	1	1
4	virtual channel 1b	282,01	303,54	1b	2	0,25	0,5
5	overlap region, PMD 1	303,65	313,92	1b	1	0,25	0,25
6	Blinded Pixel	333,92	334,37	1b	20	0,25	5
7	Blinded Pixel	412,18	411,74	2b	4	0,25	1
8	overlap region 2b	403,96	391,87	2b	4	0,25	1
9	UV DOAS, PMD 1	391,76	320,14	2b	1	0,25	0,25
10	overlap region 2a, UV DOAS, PMD 1	320,02	309,43	2a	1	0,25	0,25
11	Blinded Pixel	301,06	300,59	2a	4	0,25	1
12	Blinded Pixel	383,56	385,84	3	16	0,0625	1
13	overlap region	391,88	404,10	3	16	0,0625	1
14		404,34	423,73	3	16	0,0625	1
15	VIS DOAS, PMD 2	423,97	526,96	3	4	0,0625	0,25
16		527,20	544,56	3	4	0,0625	0,25
17	AE	544,80	565,08	3	4	0,0625	0,25
18		565,31	597,28	3	4	0,0625	0,25
19	overlap region	597,52	605,48	3	16	0,0625	1
20	Blinded Pixel	627,41	628,40	3	16	0,0625	1
21	Blinded Pixel	595,36	596,26	4	16	0,0625	1
22	overlap region	597,60	605,43	4	16	0,0625	1
23		605,65	612,53	4	16	0,0625	1
24	PMD 3, AE	612,75	725,99	4	4	0,0625	0,25
25		726,19	753,77	4	16	0,0625	1
26	O2(A)	753,98	775,92	4	4	0,0625	0,25
27	overlap region	776,13	789,85	4	16	0,0625	1
28	Blinded Pixel	811,47	812,33	4	16	0,0625	1
29	Blinded Pixel	773,21	774,43	5	8	0,125	1
30	overlap region	776,24	789,74	5	8	0,125	1
31		790,04	798,06	5	8	0,125	1
32	PMD 4/7, AE	798,35	946,62	5	2	0,125	0,25
33		946,90	990,40	5	8	0,125	1
34	overlap region, (AE)	990,68	1056,25	5	8	0,125	1
35	Blinded Pixel	1061,68	1062,83	5	8	0,125	1
36	Blinded Pixel	971,46	978,74	6	40	0,125	5
37	overlap region	990,84	1056,23	6	8	0,125	1
38		1057,02	1233,24	6	8	0,125	1
39	AE	1234,01	1253,14	6	2	0,125	0,25
40		1253,90	1388,96	6	8	0,125	1
41	Water Vapour	1389,72	1410,36	6	2	0,125	0,25
42		1411,12	1548,51	6	8	0,125	1
43	Water/Ice cloud & PMD 5	1549,30	1670,70	6	2	0,125	0,25
44		1671,51	1695,84	6	8	0,125	1
45	add. Water/Ice cloud	1696,65	1707,26	6	2	0,125	0,25
46		1708,08	1750,09	6	8	0,125	1
47	Blinded Pixel	1765,07	1772,59	6	40	0,125	5
48	Blinded Pixel	1934,38	1935,44	7	10	0,5	5
49		1939,99	1967,79	7	10	0,5	5
50	CO2	1967,90	1984,05	7	1	0,5	0,5
51		1984,15	2029,89	7	10	0,5	5
52	CO2, H2O	2029,99	2040,19	7	1	0,5	0,5
53	Blinded Pixel	2042,80	2043,67	7	10	0,5	5
54	Blinded Pixel	2259,26	2260,47	8	10	0,5	5
55	PMD 6, Ch. 8, unused pixel	2260,61	2384,49	8	1	0,5	0,5
56	Blinded Pixel	2384,60	2385,61	8	10	0,5	5
57							
58							
59							
60							
61							
62							
63							
64							
Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							390784

OCR_48: Configuring SCIAMACHY for Modified Orbit in Mission Extension

SCIAMACHY	**Operation Change Request**	OCR No: 48
		Issue: 3

Title: Configuring SCIAMACHY for Modified Orbit in Mission Extension

<u>Description of Request:</u>

The measurement final flight configuration of SCIAMACHY has to be modified in response to the orbit change required for extending ENVISAT operations until the end 2013/2014. It affects measurement state parameters and timelines. Details of the required changes are described – together with a thorough mission extension orbit analysis – in the document [R1] *SCIAMACHY Mission Extension Orbit Analysis, PO-TN-DLR-SH-0021*. Together with the modifications of several engineering parameters – see *The Impact of the ENVISAT Mission Extension on the SCIAMACHY Scanner Control System, TN-SCIA-0000DO/31* [R2] – it is ensured that the performance of SCIAMACHY measurement operations can be maintained throughout the mission.

The corresponding modifications reflect how the azimuth and elevation of the Line-of-Sight (LoS) differ when the ENVISAT orbit is lowered by about 17 km. In order not to jeopardize the limb/nadir matching, SCIAMACHY's unique capability supporting the separation of tropospheric and stratospheric contributions, the duration of the limb states has to be adjusted by omitting the final horizontal scan. In addition the start altitude of the limb scans is raised by one vertical step of about 3 km for maintaining the maximum limb altitude.

According to [R1] the following measurement parameter tables need changing:

- Basic profile: adjust 5 basic scan positions in elevation and 1 basic scan elevation rate
- Relative profile: adjust wide swath width in limb to match reduced across-track extent of nadir states
- Scanner state: adjust number of horizontal scans and phase duration in limb states
- State duration: adjust duration of limb states (SDPU duration, Wait Measurement Execution, State duration)

Because all limb states are shortened, the timeline definitions change as well. This necessitates the generation and upload of a new timeline set (t/l set 36).

Note that none of the mission scenarios require modifications. The goal is to continue routine operations after the orbit manoeuvre without introducing new scientific, calibration or monitoring measurements.

Because in addition to the inclination, both the semi-major axis and orbital period also drift slightly in the mission extension phase (see [R1]), the corresponding engineering parameters are updated on a regular basis (see [R2]). For the semi-major axis related parameters this will occur 3×, for the inclination 20× as specified in the SCIAMACHY Operations Request (SOR) for the engineering parameter update. In order to comply with the definitions of the engineering parameters, the basic profile and relative profile modifications will be updated with the rate of the semi-major axis parameter. This requires issuing corresponding OCRs at the appropriate dates.

Originator: M. Gottwald, E. Krieg, DLR-IMF	Date of Issue: 22/09/2010	Signature: M. Gottwald via email 22/09/2010

Assessment of SSAG/SQWG (necessary for requests by scientists): The proposed implementation of the modification of the limb states in order to have good limb-nadir matching in the new orbit, is in-line with the recommendation made by SSAG in February 2010, to start each limb state at an altitude of 0 km (instead of -3 km) thus maintaining the final limb altitude at about 93 km.		
SSAG: H. Bovensmann, IUP	Date: 27/09/2010	Signature: H. Bovensmann vie e-mail, 27/09/2010
Classification of OCR:		
OCR Analysis (incl. Implementation Option): The analysis can be found in [R1]. The appendix attached to this OCR lists all of the four modified measurement parameter tables and provides a summary of the new t/l set 36.		
SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 22/09/2010	Signature: M. Gottwald via email 22/09/2010
Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, E. Krieg, DLR-IMF	Date: 22/09/2010	Signature: M. Gottwald via email 22/09/2010
SSAG Approval: H. Bovensmann, IUP	Date: 27/09/2010	Signature: H. Bovensmann via e-mail 27/09/2010
Decision / Approval: Approved as proposed.		
DLR Approval: A. Friker (if necessary NIVR, SPEC)	Date: 27/09/2010	Signature: A. Friker via e-mail 27/09/2010
Implementation by SOST: According to current planning it is expected that the new final flight configuration becomes operational on October 27th, 2010. The parameter CTI tables will be uploaded in orbit 45261 (October 27th, 2010, 00:14:33 UTC) and the new timeline set in orbit 45262 (October 27th, 2010, 01:54:47 UTC). Both uploads are driven by the Mission Planning System (MPS). With the start of t/l 1 in orbit 45262 the modified configuration of SCIAMACHY in ENVISAT's mission extension orbit becomes operational.		
SOST M. Gottwald/E. Krieg, DLR-IMF	Date: 22/09/2010	Signature: M. Gottwald via email 22/09/2010

Annex: CTI parameter tables to be modified and summary of new timeline set

For a detailed analysis see document [R1]. Entries marked in red are modified values.

Basic Profile table:

Basic Scan Profile ID	Azimuth		Elevation		Note: All positions are effective scanner positions. Conversion algorithms of H/W- constellation are not considered. All angular positions/rates are given in ASM/ESM scanner notation.
	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Intended use
0	0000000000	000000	-0000261799	000000	ASM position IDLE ESM position IDLE
1	0000000000	000000	-0000794125	000000	ASM new unused position pointing into telescope, mirror not used ESM pointing in nadir direction (-z) - start position for nadir_pointing_left
2	-0000785398	000000	-0000235814	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at the horizon (limb start altitude = 0 km)
3	-0000471239	000131	-0000174405	000000	ASM following trajectory of sun from position of sunrise ESM pointing at 350 km above horizon
4	0003298672	-008145	0000986111	000000	ASM_Diffuser_1 - starting position +9 deg diffuser normal ESM pointing to mean sun elevation within sub-solar window
5	-0001003564	-000174	-0000211563	000000	ASM following moon trajectory from mean position of the full moon (245 deg) - currently unused ESM pointing at 150 km above horizon
6	-0000468621	000131	0002879793	000000	ASM following sun trajectory ESM diffusor in fixed ESM pos. of 180-15 deg - timing required for normal incidence of sun on ESM
7	-0006283185	000000	-0006283185	000000	ASM position for 360 deg revolution of scanner bearings ESM position for 360 deg revolution of scanner bearings
8	-0000468621	000131	0000570714	000222	ASM following sun trajectory ESM following sun via extra_mirror with half angular velocity from start at 150 km above horizon
9	-0000785398	000000	-0000193833	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at 250 km above horizon
10	0003263766	-008145	0000170480	000000	ASM_Diffuser_2 - starting position +7 deg diffuser normal; ASM_diffuser_atmosphere ESM pointing to SLS (9.768 deg)
11	0003228859	-008145	0003319617	000000	ASM_Diffuser_3 - starting position +5 deg diffuser normal ESM pointing diffusor to internal calibration sources (10.2 + 180 deg)
12	0003193953	-008145	0000183658	000000	ASM_Diffuser_4 - starting position +3 deg diffuser normal ESM pointing to WLS (10.523 deg)
13	0003159046	-008145	0000186279	000000	ASM_Diffuser_5 - starting position +1 deg diffuser normal* ESM pointing to WLS under non-optimal angle (10.673 deg)
14	-0000471239	000227	-0000233153	000000	ASM following trajectory of sun from position of sunrise ESM pointing at 17.2 km above horizon

* ASM position might change by -4 deg when solar azimuth exceeds 338.5 deg around orbits 48000 and 54000

Relative Profile table:

Scanner Relative Profile 3	Common Parameter	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8
Number of used Segments	4								
Profile ID	3								
Duration of Segment [msec]		50	51	50	1536	0	0	0	0
Angular Variation [mrad]		-589	-589	0	36671	0	0	0	0
Acceleration at Start of Segment [mrad/sec2]		471	0	471	0	0	0	0	0
Acceleration at End of Segment [mrad/sec2]		471	0	471	0	0	0	0	0
Number of Support Points		5	1	5	1	0	0	0	0
BCPS Synchronisation		1	0	0	0	0	0	0	0
	Common Parameter	Segment 9	Segment 10	Segment 11	Segment 12	Segment 13	Segment 14	Segment 15	Segment 16
Duration of Segment [msec]		0	0	0	0	0	0	0	0
Angular Variation [mrad]		0	0	0	0	0	0	0	0
Acceleration at Start of Segment [mrad/sec2]		0	0	0	0	0	0	0	0
Acceleration at End of Segment [mrad/sec2]		0	0	0	0	0	0	0	0
Number of Support Points		0	0	0	0	0	0	0	0
BCPS Synchronisation		0	0	0	0	0	0	0	0

Scanner State table (representative examples for wide and small swath limb state):

Scanner State Parameter #28	28	Limb_short							
	Common Parameter	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	28								
spare									
Relative Scan Profile 1 Factor	006								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	004								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		00001300	00048937	00000250	00001438	00000840	00000000	00000000	00000000
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		3	3	3	3	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		2	2	9	9	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	28	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		3	3	3	3	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		2	2	9	9	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	28	0	0	0	0	0	0

Scanner State Parameter #34	34	Limb_short							
	Common Parameter	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	34								
spare									
Relative Scan Profile 1 Factor	006								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	5								
Duration of Phase [msec]		00001300	00048937	00000250	00001438	00000840	00000000	00000000	00000000
Phase Type		0	1	0	1	0	0	0	0
Azimuth Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		1	1	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		3	3	3	3	0	0	0	0
Azimuth Relative Scan Profile Identifier		3	3	0	0	0	0	0	0
H/W constellation		3	3	3	3	3	0	0	0
Azimuth Basic Scan Profile Identifier		2	2	9	9	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	28	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		3	3	3	3	0	0	0	0
Elevation Relative Scan Profile Identifier		1	1	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		2	2	9	9	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	28	0	0	0	0	0	0

State Duration table:

State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
1	255	STANDARD	1040	16617	17551	172
2	255	STANDARD	1040	16617	17551	172
3	255	STANDARD	1040	16617	17551	172
4	255	STANDARD	1040	16617	17551	172
5	255	STANDARD	1040	16617	17551	172
6	255	STANDARD	1040	16617	17551	172
7	255	STANDARD	1040	16617	17551	172
8	255	STANDARD	640	10217	11151	172
9	255	STANDARD	1040	16617	17551	172
10	255	STANDARD	1040	16617	17551	172
11	255	STANDARD	1040	16617	17551	172
12	255	STANDARD	1040	16617	17551	172
13	255	STANDARD	1040	16617	17551	172
14	255	STANDARD	1040	16617	17551	172
15	255	STANDARD	1040	16617	17551	172
16	255	STANDARD	192	3049	5713	873
17	255	STANDARD	480	7657	10050	940
18	255	STANDARD	480	7657	10050	940
19	255	STANDARD	480	7657	10050	940
20	255	STANDARD	480	7657	10050	940
21	255	STANDARD	480	7657	10050	940
22	255	STANDARD	512	8169	10562	940
23	255	STANDARD	1040	16617	17551	172
24	255	STANDARD	1040	16617	17551	172
25	255	STANDARD	1040	16617	17551	172
26	255	STANDARD	480	7657	8591	172
27	27	LIMB	648	10345	11279	172
28	27	LIMB	810	12937	13871	172
29	27	LIMB	810	12937	13871	172
30	27	LIMB	810	12937	13871	172
31	27	LIMB	810	12937	13871	172
32	27	LIMB	810	12937	13871	172
33	27	LIMB	810	12937	13871	172
34	27	LIMB	810	12937	13871	172
35	27	LIMB	810	12937	13871	172
36	27	LIMB	810	12937	13871	172
37	27	LIMB	810	12937	13871	172
38	255	STANDARD	1040	16617	17551	172
39	255	STANDARD	192	3049	5442	940
40	27	LIMB	810	12937	13871	172
41	27	LIMB	810	12937	13871	172
42	255	STANDARD	1040	16617	17551	172
43	255	STANDARD	1040	16617	17551	172
44	255	STANDARD	1040	16617	17551	172
45	255	STANDARD	1040	16617	17551	172
46	255	STANDARD	160	2537	3471	172
47	255	STANDARD	1056	16873	18171	8
48	255	STANDARD	192	3049	5977	873
49	255	STANDARD	2080	33256	34554	8
50	255	STANDARD	48	745	2043	8
51	255	STANDARD	1024	16361	17659	8
52	255	STANDARD	480	7657	9911	801
53	255	STANDARD	352	5609	7286	8
54	255	STANDARD	192	3049	3988	177
55	27	LIMB	837	13369	14303	172
56	255	STANDARD	640	10217	11156	177
57	255	STANDARD	2048	32744	33685	179
58	255	STANDARD	352	5609	7286	8
59	255	STANDARD	192	3049	5523	875
60	255	STANDARD	352	5609	7286	8
61	255	STANDARD	192	3049	5977	873
62	255	STANDARD	480	7657	10175	801
63	255	STANDARD	480	7657	8591	172
64	255	STANDARD	64	1001	2299	8
65	255	STANDARD	320	5097	10803	172
66	255	STANDARD	176	2793	4091	8
67	255	STANDARD	1280	20456	21392	174
68	255	STANDARD	48	745	2043	8
69	255	STANDARD	1280	20456	22932	877
70	255	STANDARD	1280	20456	23122	875

Timeline summary (set 36):

Set 36			Set 36		
TL ID	TL	Duration (sec)	TL ID	TL	Duration (sec)
36_01_01	SOC_beg_SOC_end_limb_sun_ns	355,57421875	36_01_02	SOC_beg_SOC_end_lmt_sun_ns	362,32421875
36_02_01	SOC_beg_SOC_150_limb_sun_ns_pt	291,57812500	36_02_02	SOC_beg_SOC_150_lmt_sun_ns_pt	298,32812500
36_03_01	SOC_150_SOC_end_sun_fs	11,84375000	36_09_02	SOC__22_SOC_end_asmd_ndfo	43,12109375
36_04_01	SOC_150_SOC_end_sun_exm_fs	11,84375000	36_16_02	SOC_end_MOC_beg_limb_nadir_sq1	2866,74218750
36_05_01	SOC_150_SOC_end_sun_exm_pt	12,84375000	36_17_02	SOC_end_MOC_beg_limb_nadir_sq1	2920,92578125
36_06_01	SOC_150_SOC_end_sun_exm_ns	19,84375000	36_18_02	SOC_end_MOC_beg_limb_nadir_sq1	2989,48437500
36_07_01	SOC__22_SOC_end_sun_esmd_ndfo	42,57812500	36_19_02	SOC_end_MOC_beg_limb_nadir_sq1	3043,66796875
36_08_01	SOC__22_SOC_end_sun_esmd_ndfi	43,60937500	36_20_02	SOC_end_MOC_beg_limb_nadir_sq1	3112,22656250
36_09_01	SOC__22_SOC_end_asmd_ndfo	43,12109375	36_21_02	SOC_end_MOC_beg_limb_nadir_sq1	3180,78515625
36_10_01	SOC__17_SOC_end_asmd_atm	45,12109375	36_22_02	SOC_end_MOC_beg_limb_nadir_sq1	3249,34375000
36_11_01	MOC_beg_MOC_200_moon_pt	47,44140625	36_23_02	SOC_end_MOC_beg_limb_nadir_sq1	3317,90234375
36_12_01	MOC_beg_MOC_end_moon_pt	135,44531250	36_24_02	SOC_end_MOC_beg_limb_nadir_sq1	3386,46093750
36_13_01	MOC_200_MOC_end_moon_ns	19,44140625	36_25_02	sub_beg_MOC_beg_limb_nadir_sq1	1014,26171875
36_14_01	SOC_end_ecl_beg_lmt_nadir_sq1	3843,37500000	36_26_02	sub_beg_MOC_beg_limb_nadir_sq1	1068,44531250
36_15_01	SOC_end_ecl_beg_lmt_nadir_sq2	3856,06250000	36_27_02	sub_beg_MOC_beg_limb_nadir_sq1	1137,00390625
36_16_01	SOC_end_MOC_beg_limb_nadir_sq1	2307,21484375	36_28_02	sub_beg_MOC_beg_limb_nadir_sq1	1191,18750000
36_17_01	SOC_end_MOC_beg_limb_nadir_sq1	2375,77343750	36_29_02	sub_beg_MOC_beg_limb_nadir_sq1	1259,74609375
36_18_01	SOC_end_MOC_beg_limb_nadir_sq1	2429,95703125	36_30_02	sub_beg_MOC_beg_limb_nadir_sq1	1328,30468750
36_19_01	SOC_end_MOC_beg_limb_nadir_sq1	2498,51562500	36_31_02	sub_beg_MOC_beg_limb_nadir_sq1	1396,86328125
36_20_01	SOC_end_MOC_beg_limb_nadir_sq1	2552,69921875	36_32_02	sub_beg_MOC_beg_limb_nadir_sq1	1465,42187500
36_21_01	SOC_end_MOC_beg_limb_nadir_sq1	2621,25781250	36_33_02	MOC_end_ecl_beg_limb_nadir_sq1	758,00781250
36_22_01	SOC_end_MOC_beg_limb_nadir_sq1	2675,44140625	36_34_02	MOC_end_ecl_beg_limb_nadir_sq1	689,44921875
36_23_01	SOC_end_MOC_beg_limb_nadir_sq1	2744,00000000	36_35_02	MOC_end_ecl_beg_limb_nadir_sq1	620,89062500
36_24_01	SOC_end_MOC_beg_limb_nadir_sq1	2798,18359375	36_36_02	MOC_end_ecl_beg_limb_nadir_sq1	552,33203125
36_25_01	sub_beg_MOC_beg_limb_nadir_sq1	523,29296875	36_37_02	MOC_end_ecl_beg_limb_nadir_sq1	483,77343750
36_26_01	sub_beg_MOC_beg_limb_nadir_sq1	577,47656250	36_38_02	MOC_end_ecl_beg_limb_nadir_sq1	415,21484375
36_27_01	sub_beg_MOC_beg_limb_nadir_sq1	646,03515625	36_39_02	MOC_end_ecl_beg_limb_nadir_sq1	346,65625000
36_28_01	sub_beg_MOC_beg_limb_nadir_sq1	700,21875000	36_40_02	MOC_end_ecl_beg_limb_nadir_sq1	278,09765625
36_29_01	sub_beg_MOC_beg_limb_nadir_sq1	768,77734375	36_41_02	MOC_end_ecl_beg_limb_nadir_sq1	209,53906250
36_30_01	sub_beg_MOC_beg_limb_nadir_sq1	822,96093750	36_56_02	sub_beg_MOC_beg_cal_monthly_orb1	866,10937500
36_31_01	sub_beg_MOC_beg_limb_nadir_sq1	891,51953125	36_57_02	MOC_end_ecl_beg_cal_monthly_spec_orb1	801,15625000
36_32_01	sub_beg_MOC_beg_limb_nadir_sq1	945,70312500	36_09_03	SOC__22_SOC_end_asmd_ndfo	43,12109375
36_33_01	MOC_end_ecl_beg_limb_nadir_sq1	1317,53515625	36_16_03	SOC_end_MOC_beg_limb_nadir_sq1	3455,01953125
36_34_01	MOC_end_ecl_beg_limb_nadir_sq1	1263,35156250	36_17_03	SOC_end_MOC_beg_limb_nadir_sq1	3523,57812500
36_35_01	MOC_end_ecl_beg_limb_nadir_sq1	1194,79296875	36_25_03	sub_beg_MOC_beg_limb_nadir_sq1	1533,98046875
36_36_01	MOC_end_ecl_beg_limb_nadir_sq1	1140,60937500	36_26_03	sub_beg_MOC_beg_limb_nadir_sq1	1602,53906250
36_37_01	MOC_end_ecl_beg_limb_nadir_sq1	1072,05078125	36_27_03	sub_beg_MOC_beg_limb_nadir_sq1	1671,09765625
36_38_01	MOC_end_ecl_beg_limb_nadir_sq1	1017,86718750	36_28_03	sub_beg_MOC_beg_limb_nadir_sq1	1739,65625000
36_39_01	MOC_end_ecl_beg_limb_nadir_sq1	949,30859375	36_33_03	MOC_end_ecl_beg_limb_nadir_sq1	140,98046875
36_40_01	MOC_end_ecl_beg_limb_nadir_sq1	895,12500000	36_34_03	MOC_end_ecl_beg_limb_nadir_sq1	72,42187500
36_41_01	MOC_end_ecl_beg_limb_nadir_sq1	826,56640625	36_56_03	sub_beg_MOC_beg_cal_monthly_orb1	988,85156250
36_42_01	MOC_200_MOC_end_nadir	72,42187500	36_57_03	MOC_end_ecl_beg_cal_monthly_spec_orb1	642,46484375
36_43_01	MOC_beg_MOC_end_nadir	140,98046875	36_09_04	SOC__22_SOC_end_asmd_ndfo	43,12109375
36_44_01	ecl_beg_ecl_end_cal_orbit_daily_2	1288,13281250	36_56_04	sub_beg_MOC_beg_cal_monthly_orb1	1057,41015625
36_45_01	SOC_end_ecl_beg_nadir_pt_left	3843,14453125	36_57_04	MOC_end_ecl_beg_cal_monthly_spec_orb1	505,34765625
36_46_01	SOC_end_ecl_beg_nadir_pt	3843,14453125	36_09_05	SOC__22_SOC_end_asmd_ndfo	43,12109375
36_47_01	SOC_end_ecl_beg_limb_nadir_sq1	3866,37109375			
36_48_01	SOC_end_sub_beg_limb_nadir_sq1	1762,06250000			
36_49_01	sub_beg_ecl_beg_limb_nadir_sq1	2013,89062500			
36_50_01	SOC_end_ecl_beg_limb_nadir_sq2	3880,74609375			
36_51_01	SOC_end_sub_beg_limb_nadir_sq2	1762,06250000			
36_52_01	sub_beg_ecl_beg_limb_nadir_sq2	1959,70703125			
36_53_01	ecl_beg_ecl_end_cal_orbit_daily_1	1288,13281250			
36_54_01	ecl_beg_ecl_end_cal_w eekly_monthly	1233,26171875			
36_55_01	SOC_end_sub_beg_cal_monthly_spec_orb1	1711,24218750			
36_56_01	sub_beg_MOC_beg_cal_monthly_orb1	811,92578125			
36_57_01	MOC_end_ecl_beg_cal_monthly_spec_orb1	869,71484375			
36_58_01	SOC_end_sub_beg_cal_monthly_spec_orb2_orb3	1666,23828125			
36_59_01	sub_beg_ecl_beg_cal_monthly_spec_orb2	1993,17187500			
36_60_01	sub_beg_ecl_beg_cal_monthly_spec_orb3	1902,49609375			
36_61_01	ecl_beg_ecl_end_cal_monthly_spec_orb2	1300,55078125			
36_62_01	ecl_beg_ecl_end_cal_monthly_spec_orb3	1297,72265625			
36_63_01	ecl_beg_ecl_end_ADC_cal	46,06250000			

OCR_49: Tangent Height Fine Tuning

SCIAMACHY	**Operation Change Request**	OCR No: 49 Issue: 3

Title: Tangent Height Fine Tuning

Description of Request:

OCR_48 modified several measurement parameters for SCIAMACHY measurement operations in the ENVISAT mission extension orbit. Some of them concerned ESM settings in the Basic Scan Profile table reflecting fixed altitudes. The uploaded new values had been derived based on simulations with the ENVISAT CFIs.

Geolocation analysis revealed that the specified tangent heights for limb-type measurements are not fully achieved with the modified Basic Scan Profile angles and a fine-tuning is required.

State	Nominal Orbit		Nominal Orbit		Mission Extension Orbit		Mission Extension Orbit	
	Start	Stop	Start	Stop	Start	Stop	Start	Stop
	Specified (km)		Executed (km)		Specified (km)		Executed (km)	
limb (28-37,40,41)	-6	250	-6,3	264	-3	250	-6,2	270
limb_mesosphere (27)	153	n.a.	153,5	n.a.	153	n.a.	158,2	n.a.
mesosphere_thermosphere (55)	153	350	153,3	370	153	350	158	350

Table 1: Specified and executed limb tangent heights in nominal and mission extension orbit.

The start position refers to the first ESM pointing, i.e. the first horizontal scan is executed 1 step (3km) above (limb – first scan at 0 km) or below (limb_mesosphere, mesosphere_thermosphere – first scan at 153 km). Discussions with SSAG and SQWG concluded that the goal for the stop altitude should be to achieve the executed values (264km and 370 km) and not the specified ones.

Originator: M. Gottwald, E. Krieg, DLR-IMF	Date of Issue: 30/11/2010	Signature: M. Gottwald via email 30/11/2010

Assessment of SSAG/SQWG (necessary for requests by scientists):

The topic was discussed at SSAG #41 and recommended for investigation. Option 1 (see SOST statement about implementation below) is recommended for implementation followed by L0 NRT verification and – if verification successful – permanent implementation asap.

SSAG: H. Bovensmann, IUP	Date: 1.12.2010	Signature: e-mail, 1.12.2010

Classification of OCR:

OCR Analysis (incl. Implementation Option):

Fine-tuning the limb tangent heights requires raising/lowering the start/stop altitudes, i.e. ESM Basic Scan settings for profiles

- 2 (limb – first scan at 0 km)
- 3 (pointing at 370 km)
- 5 (limb_mesosphere and limb_mesosphere_thermosphere – first scan at 150 km)
- 9 (pointing at 264 km)

Note profile 14 remains unchanged because the ESM setting is always overwritten by the parameters provided with the START TIMELINE MCMD.

	Angle_1km (°)	∆ Tangent Height (km)	LoS (°)	Scanner (10e-6 rad)
Profile 2 (ESM pointing at -3km)	0,017597629	3,2	-26,96588511	-235322
Profile 5 (ESM pointing at 153 km)	0,019557482	-5	-24,34108758	-212417
Profile 9 (ESM pointing at 264 km)	0,021490255	-6	-22,34050896	-194958
Profile 3 (ESM pointing at 370 km)	0,023658735	20	-19,51209867	-170276

Table 2: Required limb altitude corrections in mission extension orbit and resulting Basic Scan Profile angles.

The 4 updated scanner ESM settings shall be tested in several consecutive orbits. Two options are possible.

Option 1: Execute test for 4 orbits and afterwards return to current final flight settings. Permanent implementation would follow once the modified settings have been verified by NRT level 0 analysis. It has to be noted that the new value for profile 3 (370 km) cannot be part of this test provided it occurs prior to December 15th (the corresponding state 55 – *limb_mesosphere_thermosphere* – is only scheduled on December 15th). Since this limb altitude is the least critical, it would however be justified that the change from 350 km to 370 km would be made together with the potential permanent upload of the other three profile values.

Option 2: Execute test but leave the modified values on-board. Only when the NRT level 0 analysis has indicated that the updated values do not deliver the specified tangent heights, we return to the current final flight settings. In this case a more detailed analysis is required why the executed limb altitudes failed again.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 30/11/2010	Signature: M. Gottwald via email 30/11/2010
Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, E. Krieg, DLR-IMF	Date: 30/11/2010	Signature: M. Gottwald via email 30/11/2010
SSAG Approval: H. Bovensmann, IUP	Date: 1.12.2010	Signature: H. Bovensmann via e-mail 1.12.2010

Decision / Approval: Option 1 (see SOST statement on implementation below) is approved for implementation followed by the appropriate verification. Permanent implementation will be decided in a new OCR if the change turns out to be successful. The discrepancy between specified altitude and executed altitude is to be monitored by SOST and further discussed with ESA and probably with industry.		
DLR Approval: A. Friker (if necessary NIVR, SPEC)	Date: 01.12.2010	Signature: A. Friker via e-mail 01.12.2010
Implementation by SOST: The proposed Basic Scan Profile test (option 1) requires changing measurement parameters only. Therefore it can be executed without modifying the schedule. Validity start time of the test settings is selected for December 8th starting in orbit 45865. In orbit 45869 the current final flight Basic Scan Profile is uploaded again.		
SOST M. Gottwald/E. Krieg, DLR-IMF	Date: 2/12/2010	Signature: M. Gottwald via email 2/12/2010

Annex:

Modified Basic Scan Profile table:

Basic Scan Profile ID	Azimuth		Elevation		Note: All positions are effective scanner positions.
	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Conversion algorithms of H/W- constellation are not considered. All angular positions/rates are given in ASM/ESM scanner notation. Intended use
0	0000000000	000000	-0000261799	000000	ASM position IDLE ESM position IDLE
1	0000000000	000000	-0000794125	000000	ASM new unused position pointing into telescope, mirror not used ESM pointing in nadir direction (-z) - start position for nadir_pointing_left
2	-0000785398	000000	-0000235322	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at an altitude of -3 km
3	-0000471239	000131	-0000170276	000000	ASM following trajectory of sun from position of sunrise ESM pointing at an altitude of 370 km
4	0003298672	-008145	0000986111	000000	ASM_Diffuser_1 - starting position +9 deg diffuser normal ESM pointing to mean sun elevation within sub-solar window
5	-0001003564	-000174	-0000212417	000000	ASM following moon trajectory from mean position of the full moon (245 deg) - currently unused ESM pointing at an altitude of 153 km
6	-0000468621	000131	0002879793	000000	ASM following sun trajectory ESM diffusor in fixed ESM pos. of 180-15 deg - timing required for normal incidence of sun on ESM
7	-0006283185	000000	-0006283185	000000	ASM position for 360 deg revolution of scanner bearings ESM position for 360 deg revolution of scanner bearings
8	-0000468621	000131	0000570714	000222	ASM following sun trajectory ESM following sun via extra_mirror with half angular velocity from start at 150 km above horizon
9	-0000785398	000000	-0000194958	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at an altitude of 264 km
10	0003263766	-008145	0000170480	000000	ASM_Diffuser_2 - starting position +7 deg diffuser normal; ASM_diffuser_atmosphere ESM pointing to SLS (9.768 deg)
11	0003228859	-008145	0003319617	000000	ASM_Diffuser_3 - starting position +5 deg diffuser normal ESM pointing diffusor to internal calibration sources (10.2 + 180 deg)
12	0003193953	-008145	0000183658	000000	ASM_Diffuser_4 - starting position +3 deg diffuser normal ESM pointing to WLS (10.523 deg)
13	0003159046	-008145	0000186279	000000	ASM_Diffuser_5 - starting position +1 deg diffuser normal* ESM pointing to WLS under non-optimal angle (10.673 deg)
14	-0000471239	000227	-0000233153	000000	ASM following trajectory of sun from position of sunrise ESM pointing at an altitude of 17.2 km

OCR_50: Tangent Height Permanent Adjustment

SCIAMACHY	Operation Change Request	OCR No: 50 Issue:

Title: Tangent Height Permanent Adjustment

Description of Request:

OCR_48 modified several measurement parameters for SCIAMACHY measurement operations in the ENVISAT mission extension orbit. Some of them concerned ESM settings in the Basic Scan Profile table reflecting fixed altitudes.

Geolocation analysis had revealed that the specified tangent heights for limb-type measurements were not fully achieved with the modified Basic Scan Profile angles and a test with fine-tuned parameters was executed on December 8th (OCR_49). The limb tangent heights derived from these settings are illustrated in annex 1. It is obvious that the required altitudes

- limb first scan: 0 km
- limb dark current step: 264 km
- limb_mesosphere first scan: 150 km

were almost met. Only small discrepancies persisted (limb first scan 310 m too high, limb dark current step 975 m too low, limb_mesosphere first scan 675 too low). Similar small deviations from the specified altitudes were also present in the nominal orbit.

Since limb retrieval experts do not consider these deviations critical (C. von Savigny, e-mail dated 15/12/2010) we propose to upload the test Basic Scan Profile table for permanent implementation.

Originator: M. Gottwald, E. Krieg, DLR-IMF	Date of Issue: 16/12/2010	Signature: M. Gottwald via email 16/12/2010

Assessment of SSAG/SQWG (necessary for requests by scientists):

SSAG: H. Bovensmann, IUP	Date: 20.12.2010	Signature: H. Bovensmann, e-mail 20.12.2010

Classification of OCR:

OCR Analysis (incl. Implementation Option):

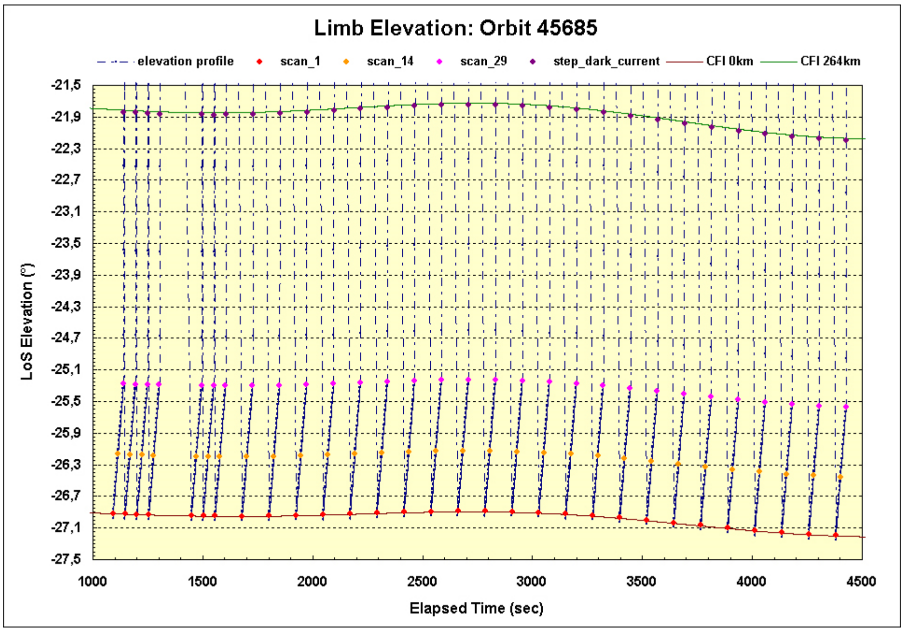
Use the Basic Profile Scan CTI table given in annex 2. For the upload we propose orbit 46340 (January 10th) with a validity start at about 03:02 UTC. This avoids conflicts with the Christmas holiday period and ensures quick verification of successful implementation.

Note that the Basic Profile value for the dark current step in the limb_mesosphere_thermosphere state (370 km) has not been tested on December 8th. We assume however, that the adjusted parameter provides as in the case of the values for 0 km, 150 km and 264 km the correct geolocation within the same accuracy range.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 16/12/2010	Signature: M. Gottwald via email 16/12/2010

Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, E. Krieg, DLR-IMF	Date: 16/12/2010	Signature: M. Gottwald via email 16/12/2010
SSAG Approval: H. Bovensmann, IUP	Date: 20.12.2010	Signature: H. Bovensmann, e-mail 20.12.2010
Decision / Approval: To be implemented as described		
DLR Approval: A. Friker (if necessary NIVR, SPEC)	Date: 20.12.2010	Signature: A. Friker via e-mail 20.12.2010
Implementation by SOST: The Basic Scan Profile CTI table will be uploaded in orbit 46340 (January 10th, 2011, 03:02:00 UTC). With the start of t/l 1 in orbit 46340 the new final flight configuration will become operational.		
SOST M. Gottwald/E. Krieg, DLR-IMF	Date: 20/12/2010	Signature: M. Gottwald via e-mail 20/12/2010

Annex 1: Verification of Limb Tangent Heights of OCR_49 Test



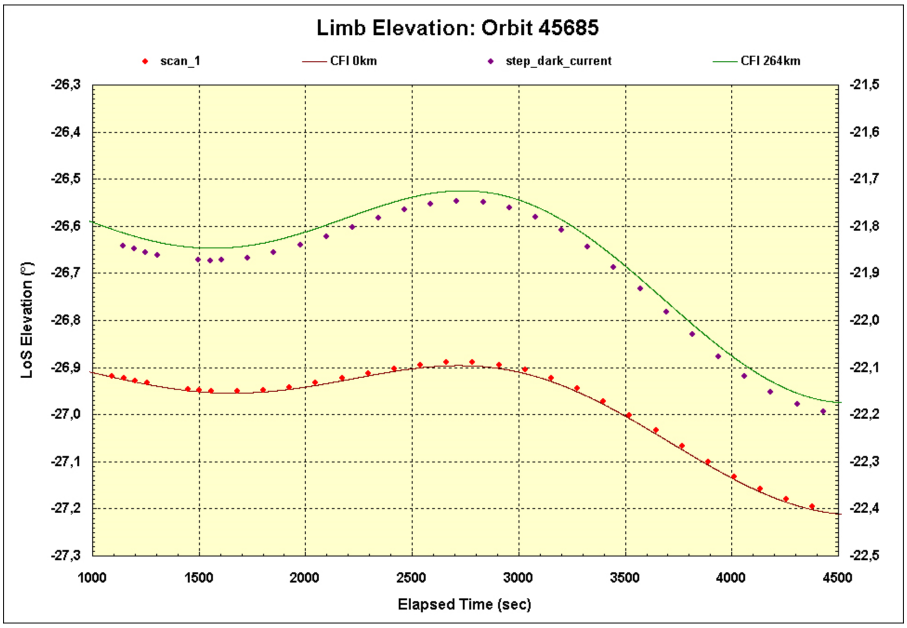
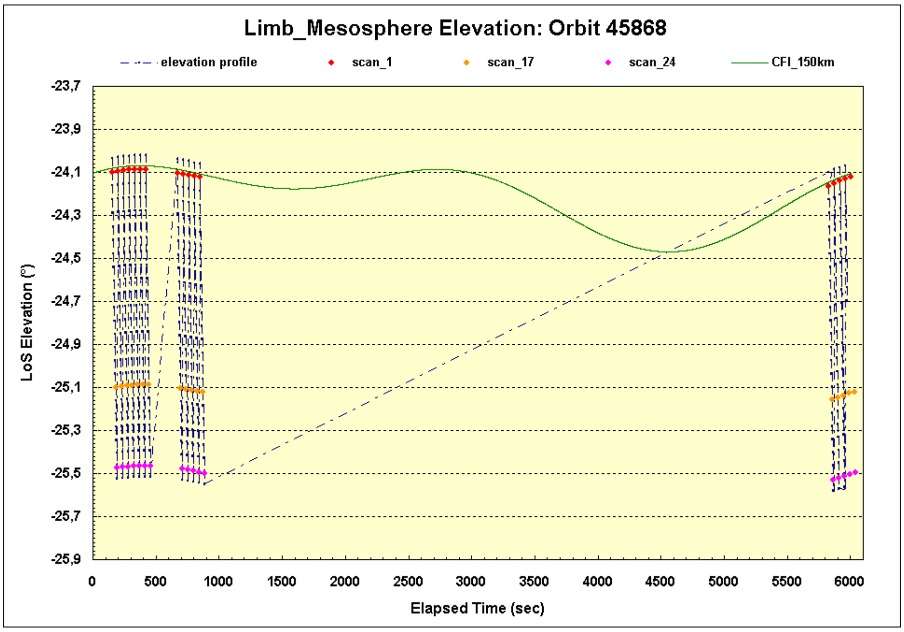


Fig. 1: Limb sequence in orbit 45865. The top graph displays ESM readings, selected scans (dots) and tangent altitudes as derived from the CFIs (solid lines). The bottom graph shows the specified altitudes of 0 km (left axis) and 264 km (right axis) in detail.



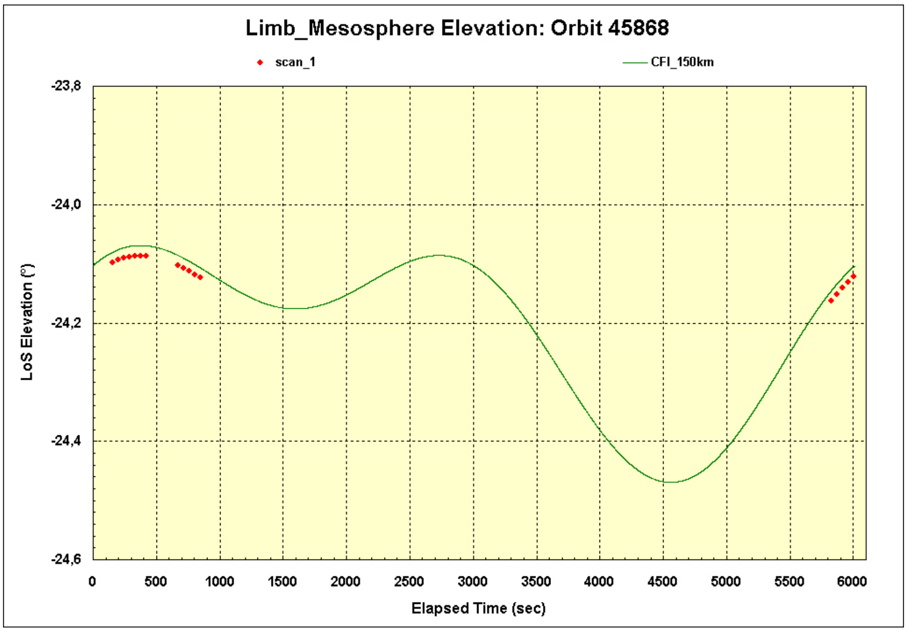


Fig. 2: Same as fig. 1 but now for the limb_mesosphere state (ID 27) sequence in orbit 45868. The bottom graph shows the specified altitudes of 150 km in detail.

Annex 2:

Modified Basic Scan Profile table:

Basic Scan Profile ID	Azimuth		Elevation		Note: All positions are effective scanner positions.
	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Basic Scan Position 10-6 rad	Basic Scan Rate 10-6 rad/sec	Conversion algorithms of H/W- constellation are not considered. All angular positions/rates are given in ASM/ESM scanner notation. Intended use
0	0000000000	000000	-0000261799	000000	ASM position IDLE ESM position IDLE
1	0000000000	000000	-0000794125	000000	ASM new unused position pointing into telescope, mirror not used ESM pointing in nadir direction (-z) - start position for nadir_pointing_left
2	-0000785398	000000	-0000235322	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at an altitude of -3 km
3	-0000471239	000131	-0000170276	000000	ASM following trajectory of sun from position of sunrise ESM pointing at an altitude of 370 km
4	0003298672	-008145	0000986111	000000	ASM_Diffuser_1 - starting position +9 deg diffuser normal ESM pointing to mean sun elevation within sub-solar window
5	-0001003564	-000174	-0000212417	000000	ASM following moon trajectory from mean position of the full moon (245 deg) - currently unused ESM pointing at an altitude of 153 km
6	-0000468621	000131	0002879793	000000	ASM following sun trajectory ESM diffusor in fixed ESM pos. of 180-15 deg - timing required for normal incidence of sun on ESM
7	-0006283185	000000	-0006283185	000000	ASM position for 360 deg revolution of scanner bearings ESM position for 360 deg revolution of scanner bearings
8	-0000468621	000131	0000570714	000222	ASM following sun trajectory ESM following sun via extra_mirror with half angular velocity from start at 150 km above horizon
9	-0000785398	000000	-0000194958	000000	ASM pointing in direction of velocity vector (-y) ESM pointing at an altitude of 264 km
10	0003263766	-008145	0000170480	000000	ASM_Diffuser_2 - starting position +7 deg diffuser normal; ASM_diffuser_atmosphere ESM pointing to SLS (9.768 deg)
11	0003228859	-008145	0003319617	000000	ASM_Diffuser_3 - starting position +5 deg diffuser normal ESM pointing diffusor to internal calibration sources (10.2 + 180 deg)
12	0003193953	-008145	0000183658	000000	ASM_Diffuser_4 - starting position +3 deg diffuser normal ESM pointing to WLS (10.523 deg)
13	0003159046	-008145	0000186279	000000	ASM_Diffuser_5 - starting position +1 deg diffuser normal* ESM pointing to WLS under non-optimal angle (10.673 deg)
14	-0000471239	000227	-0000233153	000000	ASM following trajectory of sun from position of sunrise ESM pointing at an altitude of 17.2 km

OCR_51: Observation of Venus and Jupiter in 2011

SCIAMACHY	Operation Change Request	OCR No: 51
		Issue:

Title: Observation of Venus and Jupiter in 2011

Description of Request:

The observation of Venus in 2009, originally intended for calibration purposes, also proved to be very successful in terms of Venus atmospheric science. Both the measurements in March and June 2009 delivered spectra of the Venus atmosphere displaying detailed absorption features. The different phases of Venus at both dates were even equivalent to different viewing geometries. The scientific value of these measurements is not only to supplement e.g. spectral observations by other spacecraft but also to support studies of exoplanets, e.g. as pursued in the Helmholtz Alliance *Planetary Evolution and Life*.

We propose to observe the bright planets Venus and Jupiter – both being covered by dense atmospheres – in 2011. For Venus it is a repetition, Jupiter should be observed for the first time. The measurements would both be useful for atmospheric studies and instrument characterisation purposes: By selecting appropriate dates both planets, i.e. point sources, can be observed at azimuth angles where the instrument extra mispointing has different effects on pointing accuracy. When the planets rise just in flight direction only the contribution of the pitch mispointing is relevant. Thus we expect to further verify or even improve the current extra mispointing model.

Originator: M. Gottwald, E. Krieg DLR-IMF	Date of Issue: 22/12/2010	Signature: via e-mail 22/12/201

Assessment of SSAG (necessary for requests by scientists):

SSAG: H. Bovensmann, IFE	Date: 07/01/2011	Signature: via e-mail 07/01/2011

Classification of OCR:

OCR Analysis (incl. Implementation Option):

Since slit width calibration is no longer a driver for observing bright planets (R. Snel, private communication), we propose to use the 'simple' approach from the 2009 Venus observations, i.e. perform a single scan over the planet. Thus the measurement strategy is as follows:

- place IFoV with a certain margin (specified below) above the planet
- start measurement when planet has reached an altitude of 100 km
- move IFoV in elevation with a rate slightly smaller than elevation rate of rising planet, i.e. planet overtakes IFoV and a signal is obtained when the planet is in the IFoV.
- execute this sequence in 5 consecutive orbits

For each observation the elevation difference between the planet and the IFoV should be 0.02° (Venus) / 0.028° (Jupiter). The duration of the complete measurement amounts to about 90 sec.

1) Visibility of the Venus and Jupiter (see Annex 1) and Timeline Definition

In May 2011 both planets can be found in the same area of the morning sky. Therefore selecting this period ensures that in the state and timeline definitions the same rules apply.

OCR Analysis (continued):

The proposed sequence of the timelines in the Venus and Jupiter observation orbits is as follows:

- t/l 01 (routine t/l of set 36): Sun in SO&C window preceded by 4 limb states
- test timelines of set 09: Venus/Jupiter observation starting at a planet's altitude of 100 km with a Sun elevation < 10° (Note: although this is an unusual GEO_NUM value, the SCIACAL specification confirms its applicability. Therefore the 'planet' t/l can be constructed as a *Sun_fixed* timeline). The t/l ends when the planet reaches the upper edge of the limb TCFoV. Five separate timelines, one for each orbit, are needed. Since the Sun is above the Earth's horizon during the Venus/Jupiter observation, stray light has to be corrected for. Thus the final orbit executes an identical measurement but with the azimuth shifted by 3° to the right. Set 09 test timelines are 03-08 (Venus) and 09-14 (Jupiter).
- t/l 31 & 32: (test timelines of set 09): Alternating limb/nadir measurements between end of planet observation and start eclipse phase. Each test timeline is equivalent to the nominal timelines 47 & 50 but is shorter by about 360 sec. The nominal states not being executed in exchange of the planet observation are about 4 limb and 2 nadir states each orbit. They would have been executed over northern Canada to eastern Siberia.
- t/l 53/44 (routine t/l of set 35): eclipse phase

We propose to schedule

Venus: orbit 47994-47999 (May 5th, 2011 – DoY 124), orbit 47994-47998 (planet), orbit 47999 (stray light)
Jupiter: orbit 48069-48074 (May 10th, 2011 – DoY 129), orbit 48069-48073 (planet), orbit 48074 (stray light)

Jupiter as an outer planet is observed in full illumination. This is also the case for the inner planet Venus since it is located beyond the Sun. The Venus measurements therefore supplement the 2009 observations where Venus illumination amounted to about 3% (March) and 50% (June).

The dates specified above were selected such that Venus and Jupiter appear at an azimuth of 360°. In this direction only the pitch mispointing is applicable. For the first time a point source would cross the IFoV in this configuration. Depending on the pointing performance, i.e. impact of the platform attitude residuals, it might be possible to derive from the shape of the recorded intensity profile further knowledge about the pitch mispointing.

In total 6 test timelines (set 09) are required for each planet in each observation run.

2) Line-of-Sight Control (see Annex 2 and 3)

For the duration of the OCR_51 measurements state ID 24 (nadir_pointing) will be temporarily overwritten. Five CT parameter tables are affected:

- State Duration table
- Scanner State parameter table
- Basic Profile table (here compliance with other state executions needs to be considered)
- Pixel Exposure Time table
- State Index table

The corresponding parameter values will be listed in annex 3.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 23/2/2011	Signature: via e-mail 23/2/2011

<table>
<tr><td colspan="3">Approval of Proposed Implementation:</td></tr>
<tr><td>Originator Approval: M. Gottwald, E. Krieg, DLR-IMF</td><td>Date: 23/2/2011</td><td>Signature: via e-mail 23/2/2011</td></tr>
<tr><td>SSAG Approval: H. Bovensmann</td><td>Date: 28.2.2011</td><td>Signature: via e-mail 28/2/2011</td></tr>
<tr><td colspan="3"><u>Decision / Approval:</u>
To be implemented as described.</td></tr>
<tr><td>DLR Approval: A. Friker</td><td>Date: 28.02.2011</td><td>Signature: via e-mail 28.02.2011</td></tr>
<tr><td colspan="3"><u>Implementation by SOST</u>:
A sequence of 6 orbits (5 observing the planet, 1 for obtaining background stray light information) is scheduled on May 5th, 2011 (orbit 47994-47999) for Venus. Jupiter is observed 5 days later on May 10th, 2011 (orbit 48069-48074), again in 6 orbits (5 observing the planet, 1 for obtaining background stray light information).
In total 6 CTI parameter tables are uploaded, both for Venus and Jupiter. For each planet the Basic Scan Profile table needs to be uploaded twice with slightly modified azimuth basic scan positions to account for the planet and background measurement. Timelines use IDs 03, 04, 05, 06, 07, 08 (all Venus), 09, 10, 11, 12,13, 14 (all Jupiter) and 31, 32 (shortened limb/nadir sequences between end of planet t/l and start of eclipse) from test set 09.</td></tr>
<tr><td>SOST: M. Gottwald, E. Krieg, DLR-IMF</td><td>Date: 23/3/2011</td><td>Signature: via e-mail 23/3/2011</td></tr>
</table>

Annex 1: Venus and Jupiter 2011 Visibility Analysis

Fig. 1 displays the azimuth and elevation difference Sun-Venus for 2011 when Venus is within the limb TCFoV (azimuth = 316° to 44°, elevation = -27.3° to 19.5°). The difference is determined when Venus has reached an elevation which corresponds to an altitude of approx. 100 km. In 2011 Venus superior conjunction (Venus behind Sun) occurs on day 226 (August 16th) and no inferior conjunction (Venus between Earth and Sun) is visible. The apparent brightness on May 5th amounts to -3.84 mag (similar to June 2009 when Venus was at -4.07 mag). The distance of 218 $\times$ 10^6 km leads to a diameter of approx. 11” (20” in June 2009), i.e. Venus fits well into the 0.045° high IFoV.

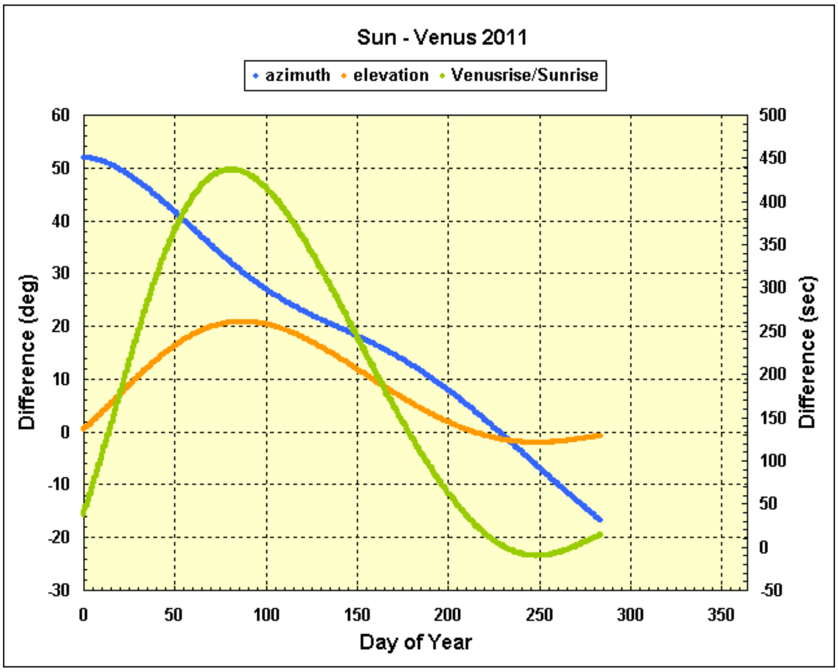


Fig. 1: Venus visibility in the limb TCFoV for the year 2011.

The green curve in fig. 1 (secondary axis) shows the time difference between the Sun at an altitude of 17 km and Venus at 100 km. Positive values represent periods when the Sun rises before Venus, negative values those where Venus precedes the Sun. Since Venus moves with an elevation rate through the limb TCFoV, which is similar to the solar rate, the green curve permits an estimate when measurements between 100 km and the upper edge of the limb TCFoV are possible with the Sun still being either below the horizon or having already left the limb TCFoV. It is obvious from fig. 1 that in all suitable periods in 2011 sunrise occurs before the rise of Venus. Fig. 2 displays the relative positions of the Earth, Venus and Sun at the time of measurement.

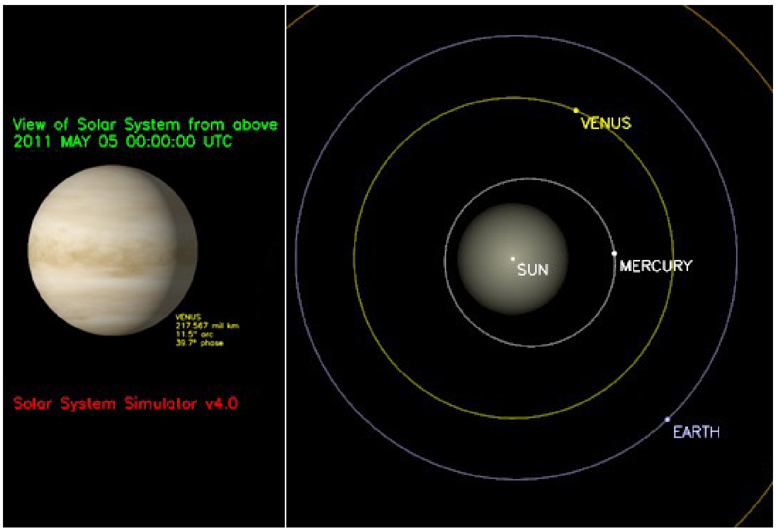


Fig. 2: The inner solar system and Venus' illumination on 5 May 2011.

Fig. 3 is identical to fig. 1 but now for Jupiter. On April 6th, 2011 Jupiter is in conjunction (Jupiter behind Sun) and cannot be observed. From then on it slowly becomes a target in the morning sky. The apparent brightness on May 10th is -2.07 mag with an apparent diameter of 34”, corresponding to a distance of 877 $\times$ 10^6 km. As in the case of Venus the celestial position of Jupiter favours occasions when Jupiter rises after the Sun. The extreme case at the end of the 2011 when the time difference between Jupiter at 100 km and Sun at 17 km of > 3000 sec indicates that Jupiter would be visible in the TCFoV above the southern hemisphere close to the start of the eclipse phase. Fig. 4 is the graphs equivalent to Fig. 2, but now for Jupiter on 10 May 2011 and orbit 48069.

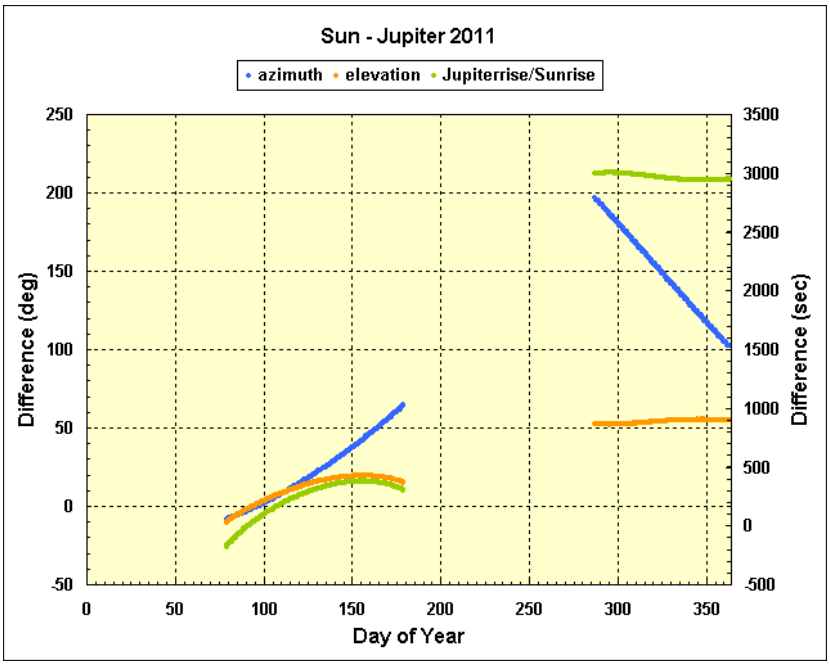


Fig. 3: Jupiter visibility in the limb TCFoV for the year 2011.

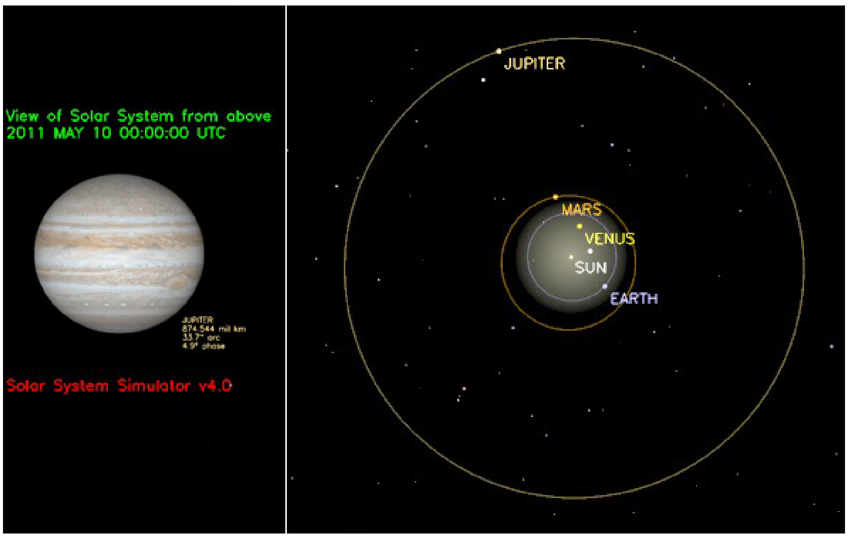


Fig. 4: The inner solar system and Jupiter’s illumination on 10 May 2011.

Planet/Sun Visibility Parameters:

Venus (mispointing) - DoY 124 diameter 11.4" - brightness -3.84 mag	47994	47995	47996	47997	47998	47999
azimuth (°)	0,080	0,078	0,075	0,072	0,069	3,066
azimuth rate (°/sec)	-0,0026	-0,0026	-0,0026	-0,0026	-0,0026	-0,0026
elevation (°)	25,057	25,060	25,062	25,059	25,062	25,058
elevation rate (°/sec)	-0,0598	-0,0598	-0,0598	-0,0598	-0,0598	-0,0598
altitude (km)	100,1	100,0	99,9	100,0	99,9	100,0
time (UTC)	06:09:28,4	07:49:41,8	09:29:55,2	11:10:08,7	12:50:22,1	14:30:35,6
time Sun (22.5°)	06:04:57,4	07:45:11,1	09:25:24,8	11:05:38,5	12:45:52,2	14:26:05,9
Δ time (sec)	271,0	270,7	270,4	270,2	269,9	269,7
azimuth Sun (Venus 100 km)	337,764	337,773	337,782	337,791	337,800	337,808
azimuth rate Sun (Venus 100 km)	-0,0002	-0,0002	-0,0002	-0,0002	-0,0002	-0,0001
elevation Sun (Venus 100 km)	7,797	7,812	7,826	7,836	7,850	7,860
elevation rate Sun (Venus 100 km)	-0,0545	-0,0545	-0,0545	-0,0545	-0,0545	-0,0545
altitude Sun (Venus 100 km)	709,1	708,9	708,6	708,4	708,2	708,0
Jupiter (mispointing) - DoY 129 diameter 33.7" - brightness -2.07 mag	**48069**	**48070**	**48071**	**48072**	**48073**	**48074**
azimuth (°)	359,153	359,212	359,271	359,330	359,388	362,447
azimuth rate (°/sec)	-0,0019	-0,0019	-0,0019	-0,0020	-0,0020	-0,0020
elevation (°)	25,052	25,05	25,054	25,052	25,049	25,053
elevation rate (°/sec)	-0,0598	-0,0598	-0,0598	-0,0598	-0,0598	-0,0598
altitude (km)	100,0	100,1	99,9	100,0	100,1	99,9
time (UTC)	11:25:58,6	13:06:12,7	14:46:26,7	16:26:40,8	18:06:54,9	19:47:08,9
time Sun (22.5°)	11:22:04,4	13:02:18,1	14:42:31,8	16:22:45,5	18:02:59,2	19:43:12,9
Δ time (sec)	234,2	234,6	234,9	235,3	235,7	236,0
azimuth Sun (Jupiter 100 km)	338,372	338,380	338,387	338,395	338,403	338,411
azimuth rate Sun (Jupiter 100 km)	0,0008	0,0007	0,0007	0,0007	0,0007	0,0007
elevation Sun (Jupiter 100 km)	9,739	9,717	9,700	9,678	9,656	9,640
elevation rate Sun (Jupiter 100 km)	-0,0547	-0,0547	-0,0547	-0,0547	-0,0547	-0,0547
altitude Sun (Jupiter 100 km)	671,3	671,8	672,1	672,6	673,0	673,4

Table 1: Venus, Jupiter and Sun parameters for proposed orbits for a planet altitude of 100 km. The azimuth in the last orbit for each planet is shifted by 3° in order to obtain a stray light measurement under almost identical conditions.

Annex 2: Detailed State Design

For elaborating the required parameters for the selected one-scan approach, table 1 lists the Line-of-Sight parameters and ephemeris data of Venus, Jupiter and the Sun at the start of the observations. LoS parameters have been derived using the ENVISAT CFIs with a time resolution of 0.1 sec corresponding to a planet altitude resolution of 0.3 km. The full instrument mispointing in pitch, roll and yaw has been taken into account.

The measurement duration is given by the time it takes the planet to rise from 100 km to the upper edge of the limb TCFoV, i.e. to cover an elevation width of 5.9°. The resulting duration amounts to 93 sec both for Venus and Jupiter. How long the planet appears in the slit, i.e. the time it takes from start to stop of signal, depends on the selected elevation margin, the differential elevation rate between planet and slit (slit rises slower than planet) and on the planet's diameter. For the selected date – based on the experience gained from the March 2009 Venus observations – a margin of 0.020° for Venus and 0.028° for Jupiter are selected.

Together with a differential elevation rate[1] of -0.001°/sec (Venus) and -0.00125°/sec (Jupiter) ‘signal’ durations amount to 49.8 sec (Venus) and 47.2 sec (Jupiter). The planet is centred in the slit 42.5 sec (Venus) / 40.5 sec (Jupiter) after starting the measurement at a planet’s altitude of 100 km.

Annex 3: CTI Parameter Tables

A state simulation has successfully been performed using the CTI tables listed below. It proved the feasibility of the concept.

Both for the Venus and Jupiter measurements the following common CTI tables apply:

Scanner State parameter table:

Scanner State Parameter #24	24	Venus/Jupiter observation							
	Common Param.	**Phase 1**	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**	**Phase 6**	**Phase 7**	**Phase 8**
STATE ID	24								
spare									
Relative Scan Profile 1 Factor	0								
Relative Scan Profile 2 Factor	0								
Relative Scan Profile 3 Factor	0								
Relative Scan Profile 4 Factor	0								
Relative Scan Profile 5 Factor	0								
Relative Scan Profile 6 Factor	0								
Number of Scan Phases	3								
Duration of Phase [msec]		1300	90000	840	0	0	0	0	0
Phase Type		0	1	0	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
H/W constellation		3	3	3	0	0	0	0	0
Azimuth Basic Scan Profile Identifier		4	4	0	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	44	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		1	1	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		11	11	0	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	44	0	0	0	0	0	0

State Index table:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Venus/Jupiter observation OCR_051	24	1	6	6	31

[1] Note: The differential elevation rate is defined by *elevation rate (Venus) – elevation rate (IFoV)* in the CFI system. Commanded are values in the scanner system which have the opposite signs.

State Duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
Venus/Jupiter observation OCR_051	24	255	STANDARD	1440	23016	23952	174

PET table:

	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Venus/Jupiter observation OCR_051	24	Low	1	1	1	1	1	1	1	1	1	1
		High	1	1	1	1	1	1	1	1	1	1

The Basic Profile table differs between Venus and Jupiter because of the slightly different planet's azimuth angles on May 5th and May 10th. In addition for the background measurement in each of the final orbit of the measurement sequence a different azimuth angle has to be uploaded.

Basic Profile table (Venus orbit 47994-47998):

Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	23	0	-786053	986111
11	-008145	000513	3228859	-218319

Basic Profile table (Venus background orbit 47999):

Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	23	0	-812451	986111
11	-008145	000513	3228859	-218319

Basic Profile table (Jupiter orbit 48069-48073):

Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	17	0	-779028	986111
11	-008145	000513	3228859	-218249

Basic Profile table (Jupiter background orbit 48074):

Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	17	0	-806342	986111
11	-008145	000513	3228859	-218249

The timing inputs listed below for the timeline generation are identical for Venus and Jupiter.

RTCS = STT_01
RTCS set-up = 636 cts
RTCS cleanup = 279 cts (762-636-(8+8+(28-23))+174)
total RTCS-duration = 762 cts
WME = 23016 cts (90×16×16-24)
WSR = 174 cts
state duration = 23952 cts (762+23016+174 = total RTCS-duration + WME +WSR)

set-up = 636 cts = 2.48437500 sec
cleanup = 276 cts = 1.07812500 sec
measurement = 23040 cts = 90.0000000 sec
total duration = 23952 cts = 93.5625000 sec
SDPU duration = 1440 bcps
phase 1 = 1300 msec
phase 2 = 90000 msec
phase 3 = 840 msec

H:\scia\timing\timeline_set_09\tl_09_03_03.xls	Venus_100km_Venus_end - orbit 47994		Table start ID =	129	Event_type =	s_05	
DURATION <s>=	97,42578125	DTX0 <s>=	-265,74609375	DTX1 <s>=	0,00000000	DTX2 <s>=	n/a
SCHED_TYPE =	SF_FI	GEO_TYPE =	elevation_forward	GEO_NUM <deg>=	22,50	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	24	nad24	709	2,77	2,77	93,56	96,33
2	End of Timeline	End of Timeline	23952	93,56			
3	End of Timeline	End of Timeline	0				
4	End of Timeline	End of Timeline	0				
5	End of Timeline	End of Timeline	0				
6	End of Timeline	End of Timeline	0				
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61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	24661		96,33	0,09	96,43

Table 2: Example of timeline for Venus observation (orbit 47994)

H:\scia\timing\timeline_set_09\tl_09_09_02.xls		Jupiter_100km_Jupiter_end - orbit 48069		Table start ID =	513	Event_type =	s_05
DURATION <s>=	97,42578125	DTX0 <s>=	-228,94609375	DTX1 <s>=	0,00000000	DTX2 <s>=	n/a
SCHED_TYPE =	SF_FI	GEO_TYPE =	elevation_forward	GEO_NUM <deg>=	22,50	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	**State ID**	**State Description**	**State TT (relative, ct)**	**State TT (relative, sec)**	**Start Time (absolute, sec) T1 +**	**State Duration (sec)**	**End Time (absolute, sec) T1 +**
		T/L setup			0	2,77	
1	24	nad24	709	2,77	2,77	93,56	96,33
2	End of Timeline	End of Timeline	23952	93,56			
3	End of Timeline	End of Timeline	0				
4	End of Timeline	End of Timeline	0				
5	End of Timeline	End of Timeline	0				
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60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	24661		96,33	0,09	96,43

Table 3: Example of timeline for Jupiter observation (orbit 48069)

OCR_52: Increased Rate of Monitoring Measurements

SCIAMACHY	**Operation Change Request**	OCR No: 52 Issue:

Title: Increased Rate of Monitoring Measurements

Description of Request:

Currently the instrument is in a period of rapid throughput recovery. In order to follow the changes with sufficient time resolution, and to potentially improve the quality of degradation correction, the following is requested:

- During the period of rapid throughput recovery (expected to last no longer than a couple of months), increase the light path monitoring measurements to at least once per day, where possible. Emphasis is on sub-solar and WLS measurements.
- Synchronise the monitoring measurements to be executed in the same or adjacent orbits, where possible.
- Implement as soon as possible. The recovery is not understood, and it may stop any moment.

Originator: Ralph Snel, SRON	Date of Issue: 2011-12-05	Signature: RS

Assessment of SSAG (necessary for requests by scientists):

The current very fast recovery is a very unique situation and needs to be measured at an adequate temporal resolution. The proposed measurements will help to improve data quality and also will contribute to a better understanding of degradation/recovery of optical components in space.

Therefore OCR analysis is highly recommended.

SSAG: H. Bovensmann, IUP-IFE	Date: 09/12/2011	Signature: via e-mail 09/12/2011

Classification of OCR:

OCR Analysis (incl. Implementation Option):

Implementing this OCR affects mission scenarios and timelines. It is proposed to define a new final flight status (not a test status) for both including

- One subsolar measurement each day: Using the NCWM at a higher rate increases its inflight budget. Since we are currently (planning up to end of February) at 95%, the 100% limit will be reached in the first half of 2012 depending on the start of this OCR. Accepting this limit exceeding should be clearly stated in the approval of this OCR. If necessary, a dedicated ARB shall be organized.

  Note: Because of the LLI issue our implementation option does not include the maximum number of 3 subsolar measurements per day (= number of assigned subsolar calibration opportunities). If the LLI issue is considered less critical, the approval should indicate an increase of the 1/day subsolar rate up to 3/day.

OCR Analysis (continued):

- One WLS measurement in the same orbit as the subsolar measurement: The state ID 61 (lwc01) is included once in the new timelines t/l 36_61_02 and t/l 36_62_02 (see annex 1). T/l 61 is the equivalent to the eclipse t/l 44 and t/l 62 the equivalent to t/l 53. Every orbit with a subsolar measurement, either t/l 61 or 62 are scheduled depending on the status of the alternating limb/nadir pattern. Both new timelines are stored permanently onboard where they replace the t/l 36_61_01 and 36_62_01 which are only used in two monthly calibration orbits. Whenever a monthly calibration is due, we include a corresponding timeline exchange in the OSDF. Scheduling WLS measurements with a higher rate is uncritical from an LLI inflight budget point of view. End of February almost 10 years of operations have accumulated 19% of the assigned WLS inflight switches and 36% of the WLS burning time. However it is worth to also consider the WLS switches when a subsolar rate > 1/day is proposed.

An example of a sequence of orbits for two days from an OSDF is given in annex 2.

Nominal implementation of the option described above would start on March 1st when the next OSDF is due. The planning for the period January/February 2012 has already been delivered to RGT and FOCC. If possible, we try to overwrite the January/February planning as soon as possible early next year. However this depends on OCR approval timescale and ENVISAT ground segment internal work flows.

The increased subsolar rate and the new timelines, i.e. the new final flight status, shall remain implemented until a change is requested by the calibration & monitoring experts. This should occur via another OCR.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 09/12/2011	Signature: via e-mail 09/12/2011

Approval of Proposed Implementation:

R. Snel (Originator): The proposed implementation option is fine with me. However, I would like to urge all involved to try and implement this NCR as soon as possible, rather than wait till after the Christmas and new year break.

As a reminder regarding the NCWM life cycles: this is not a real life limit, but rather the side-effect of a time-limited test of the NCWM after a refurbishment. We had extensive discussions about this around June 2006. See also section 6 of TN PO-TN-DLR-SH-0018 on predictions for the mission extension beyond 2010. My proposal is to ignore the assigned in-flight budget for the NCWM. The mechanism is nearly identical to the APSM, which has survived a 220 000 cycle test, see TPD-PP-SCI-RPT-157 (Report of Aperture Mechanism (APM) additional lifetest).

SSAG: Feedback within the SSAG was all in favour of an implementation.
The issues w. r. t. the interference with the block of 15 Limb_Mesosphere_Lower_Thermosphere orbits was resolved between Manfred Gottwald, Ralf Snel and Miriam Sinnhuber, with the result that there will be no interruption of this measurement block.
Therefore I recommend — on behalf of SSAG — OCR 52 for implementation as soon as possible.

Originator Approval: R. Snel, SRON	Date: 2011/12/09	Signature: via e-mail 2011/12/09
SSAG Approval: H. Bovensmann, IUP-IFE	Date: 2011/12/14	Signature: via e-mail 2011/12/14

Decision / Approval:

BIRA, NSO, ESA, and DLR approve to implement the OCR as soon as possible in order to better understand the throughput recovery.
The OCR is to be implemented with the adaptions mentioned in the SSAG approval.
This OCR includes the violation of a life limit (exceeding the max. cycle number of the Nadir Calibration Window Mechanism). This life limit is explicitly ignored for this OCR. As the Nadir Calibration Window Mechanism is considered similar to the extensively tested Aperture Stop Mechanism it is assumed that it – though not fully tested – has a similar life limit. Budget monitoring of the Nadir Calibration Window Mechanism should continue in awareness of the violated limit and should monitor, that there remains considerable margin between the number of cycles performed by the Nadir Calibration Window Mechanism and the limit established for the comparable Aperture Stop Mechanism.

Approval: Achim Friker, DLR Harry Förster, NSO Christian Muller, BIRA Thorsten Fehr, ESA	Date: DLR 2011/12/15 NSO 2011/12/12 BIRA 2011/12/12 ESA 2011/12/12	Signature: A. Friker via e-mail: 2011/12/15 H. Förster via e-mail: 2011/12/12 C. Muller via e-mail: 2011/12/12 T. Fehr via e-mail: 2011/12/12

Implementation by SOST:

Two new eclipse timelines (36_61_02 and 36_62_02) have been added to timeline set 36. They both include one WLS measurement (state 61 lwc01).
Implementation occurs in two steps:

- Starting January 1st a subsolar measurement is executed each day. This uses already existing timelines and does not require a modification of the on-board configuration. Thus it is uncritical w.r.t. the forthcoming vacation period.
- Upload of the new eclipse timelines occurs on January 9th (vacation period has ended) in orbit 51569. From then on a WLS measurement is executed each subsolar orbit.

In orbits where a subsolar measurement would be possible but cannot be implemented because of the limb_mesosphere_lower_thermosphere state only the WLS state is executed in eclipse.

The corresponding OSDF 3611 has been ingested into the ground segment.

SOST: M. Gottwald, E. Krieg, DLR	Date: 16/12/2011	Signature: via e-mail 16/12/2011

Annex 1: New Eclipse Timelines

H:\scia\timing\timeline_set_36\tl_36_61_02.xls		ecl_beg_ecl_end_cal_orbit_daily_2		Table start ID =	3841	Event_type =	n/a
DURATION <s>=	1267,42187500	DTX0 <s>=	n/a	DTX1 <s>=	n/a	DTX2 <s>=	n/a
SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000

State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	27	elimb01	709	2,77	2,77	44,06	46,83
2	27	elimb01	11279	44,06	46,83	44,06	90,89
3	27	elimb01	11279	44,06	90,89	44,06	134,95
4	8	dcc05	11279	44,06	134,95	43,56	178,50
5	26	dcc04	11151	43,56	178,50	33,56	212,06
6	46	dcc01	8591	33,56	212,06	13,56	225,62
7	63	dcc02	3471	13,56	225,62	33,56	259,18
8	67	dcc03	8591	33,56	259,18	83,56	342,74
9	8	dcc05	21392	83,56	342,74	43,56	386,30
10	26	dcc04	11151	43,56	386,30	33,56	419,86
11	46	dcc01	8591	33,56	419,86	13,56	433,42
12	63	dcc02	3471	13,56	433,42	33,56	466,98
13	67	dcc03	8591	33,56	466,98	83,56	550,54
14	61	lwc01	21392	83,56	550,54	23,35	573,89
15	27	elimb01	5977	23,35	573,89	44,06	617,95
16	27	elimb01	11279	44,06	617,95	44,06	662,00
17	27	elimb01	11279	44,06	662,00	44,06	706,06
18	27	elimb01	11279	44,06	706,06	44,06	750,12
19	27	elimb01	11279	44,06	750,12	44,06	794,18
20	27	elimb01	11279	44,06	794,18	44,06	838,24
21	8	dcc05	11279	44,06	838,24	43,56	881,80
22	26	dcc04	11151	43,56	881,80	33,56	915,36
23	46	dcc01	8591	33,56	915,36	13,56	928,91
24	63	dcc02	3471	13,56	928,91	33,56	962,47
25	67	dcc03	8591	33,56	962,47	83,56	1046,04
26	27	elimb01	21392	83,56	1046,04	44,06	1090,09
27	27	elimb01	11279	44,06	1090,09	44,06	1134,15
28	27	elimb01	11279	44,06	1134,15	44,06	1178,21
29	27	elimb01	11279	44,06	1178,21	44,06	1222,27
30	27	elimb01	11279	44,06	1222,27	44,06	1266,33
31	End of Timeline	End of Timeline	11279	44,06			
32	End of Timeline	End of Timeline	0				
33	End of Timeline	End of Timeline	0				
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63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	324180		1266,33	0,09	1266,42

Timeline 36_61_02

H:\scia\timing\timeline_set_36\tl_36_62_02.xls		ecl_beg_ecl_end_cal_orbit_daily_1		Table start ID =	3905	Event_type =	n/a
DURATION <s>=	1267,42187500	DTX0 <s>=	n/a	DTX1 <s>=	n/a	DTX2 <s>=	n/a
SCHED_TYPE =	NF_FB	GEO_TYPE =	n/a	GEO_NUM <>=	n/a	FOV_CHECK =	NO
RATE_TYPE =	LOW	DTX3 <s>=	n/a	DTX4 <s>=	n/a	TL_PAD <s>=	1,00000000
State Running Index	State ID	State Description	State TT (relative, ct)	State TT (relative, sec)	Start Time (absolute, sec) T1 +	State Duration (sec)	End Time (absolute, sec) T1 +
		T/L setup			0	2,77	
1	8	dcc05	709	2,77	2,77	43,56	46,33
2	26	dcc04	11151	43,56	46,33	33,56	79,89
3	46	dcc01	8591	33,56	79,89	13,56	93,45
4	63	dcc02	3471	13,56	93,45	33,56	127,00
5	67	dcc03	8591	33,56	127,00	83,56	210,57
6	61	lwc01	21392	83,56	210,57	23,35	233,91
7	27	elimb01	5977	23,35	233,91	44,06	277,97
8	27	elimb01	11279	44,06	277,97	44,06	322,03
9	27	elimb01	11279	44,06	322,03	44,06	366,09
10	27	elimb01	11279	44,06	366,09	44,06	410,15
11	27	elimb01	11279	44,06	410,15	44,06	454,21
12	27	elimb01	11279	44,06	454,21	44,06	498,27
13	27	elimb01	11279	44,06	498,27	44,06	542,32
14	8	dcc05	11279	44,06	542,32	43,56	585,88
15	26	dcc04	11151	43,56	585,88	33,56	619,44
16	46	dcc01	8591	33,56	619,44	13,56	633,00
17	63	dcc02	3471	13,56	633,00	33,56	666,56
18	67	dcc03	8591	33,56	666,56	83,56	750,12
19	27	elimb01	21392	83,56	750,12	44,06	794,18
20	27	elimb01	11279	44,06	794,18	44,06	838,24
21	27	elimb01	11279	44,06	838,24	44,06	882,30
22	27	elimb01	11279	44,06	882,30	44,06	926,36
23	27	elimb01	11279	44,06	926,36	44,06	970,41
24	27	elimb01	11279	44,06	970,41	44,06	1014,47
25	27	elimb01	11279	44,06	1014,47	44,06	1058,53
26	8	dcc05	11279	44,06	1058,53	43,56	1102,09
27	26	dcc04	11151	43,56	1102,09	33,56	1135,65
28	46	dcc01	8591	33,56	1135,65	13,56	1149,21
29	63	dcc02	3471	13,56	1149,21	33,56	1182,77
30	67	dcc03	8591	33,56	1182,77	83,56	1266,33
31	End of Timeline	End of Timeline	21392	83,56			
32	End of Timeline	End of Timeline	0				
33	End of Timeline	End of Timeline	0				
34	End of Timeline	End of Timeline	0				
35	End of Timeline	End of Timeline	0				
36	End of Timeline	End of Timeline	0				
37	End of Timeline	End of Timeline	0				
38	End of Timeline	End of Timeline	0				
39	End of Timeline	End of Timeline	0				
40	End of Timeline	End of Timeline	0				
41	End of Timeline	End of Timeline	0				
42	End of Timeline	End of Timeline	0				
43	End of Timeline	End of Timeline	0				
44	End of Timeline	End of Timeline	0				
45	End of Timeline	End of Timeline	0				
46	End of Timeline	End of Timeline	0				
47	End of Timeline	End of Timeline	0				
48	End of Timeline	End of Timeline	0				
49	End of Timeline	End of Timeline	0				
50	End of Timeline	End of Timeline	0				
51	End of Timeline	End of Timeline	0				
52	End of Timeline	End of Timeline	0				
53	End of Timeline	End of Timeline	0				
54	End of Timeline	End of Timeline	0				
55	End of Timeline	End of Timeline	0				
56	End of Timeline	End of Timeline	0				
57	End of Timeline	End of Timeline	0				
58	End of Timeline	End of Timeline	0				
59	End of Timeline	End of Timeline	0				
60	End of Timeline	End of Timeline	0				
61	End of Timeline	End of Timeline	0				
62	End of Timeline	End of Timeline	0				
63	End of Timeline	End of Timeline	0				
64	End of Timeline	End of Timeline	0				
		T/L Cleanup	324180		1266,33	0,09	1266,42

Timeline 36_62_02

Annex 2: OSDF Excerpt (example only)

```
RECORD orbit: ABS_ORBIT_NUM=+51462 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51463 ID="02,03,08,48,52,63,62" ENDRECORD;
orbit_no_moon_daily_calibration_1
RECORD orbit: ABS_ORBIT_NUM=+51464 ID="02,04,09,50,63,44" ENDRECORD;
orbit_no_moon_daily_calibration_2
RECORD orbit: ABS_ORBIT_NUM=+51465 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51466 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51467 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51468 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51469 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51470 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51471 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51472 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51473 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51474 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51475 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51476 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51477 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51478 ID="02,03,08,51,49,63,61" ENDRECORD;
orbit_no_moon_daily_calibration_1
RECORD orbit: ABS_ORBIT_NUM=+51479 ID="02,04,09,47,63,53" ENDRECORD;
orbit_no_moon_daily_calibration_2
RECORD orbit: ABS_ORBIT_NUM=+51480 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51481 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51482 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51483 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51484 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51485 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51486 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51487 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51488 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51489 ID="01,47,63,53" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51490 ID="01,50,63,44" ENDRECORD; orbit_no_moon
RECORD orbit: ABS_ORBIT_NUM=+51491 ID="01,47,63,53" ENDRECORD; orbit_no_moon
```

Entries in blue: timeline with subsolar state (state ID 53 – sscp02)
Entries in green: new eclipse timelines (62 equivalent to 53, 61 equivalent to 44)

3. Operation Change Request Implementation

Of the 54 issued OCRs, two had been withdrawn and two approved ones could not be implemented after the loss of ENVISAT on 8 April 2012. Therefore in total 50 OCRs could be implemented after approval. Some of the OCRs required a stepwise approach: first a test of the concept or modified parameters, followed by the actual OCR measurements. Other OCRs asked for multiple executions in a certain timeframe, e.g. the monthly lunar windows. In three cases the modified measurement parameters had been erroneous leading to a transfer of SCIAMACHY to a model lower than MEASUREMENT or delivered corrupt data. Those OCRs had to be repeated. In one case an unrelated anomaly interrupted the OCR measurements such that these were re-scheduled after instrument recovery.

Overall 75 orbits with OCR implementations, including tests, multiple OCR runs or rescheduled OCRs occurred over the period 2003-2012. Fig. 1 displays how they were assembled in phase E. On average, about every 600-700 orbits, i.e. 6-7 weeks, instrument operations had to respond to an OCR.

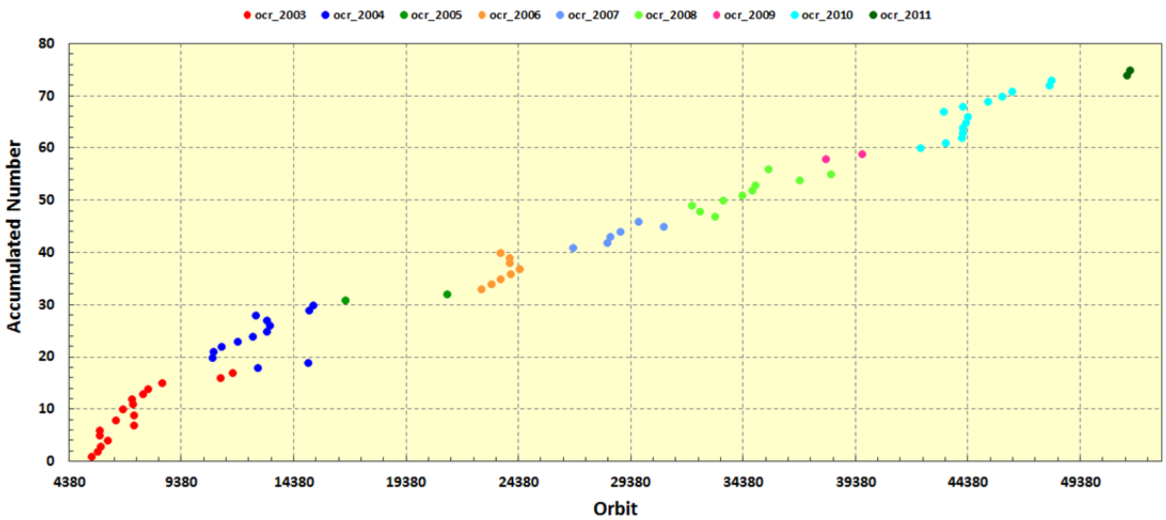

Fig. 1: OCR implementation for the years 2003-2012. The color-coding refers to the year of OCR issue.

The Table below lists all implemented OCRs. The date (start/stop) and orbit (start/stop) given refer to their implementation. OCRs required either permanent or temporary implementation. In some cases a date/orbit range is given but OCR related measurements had only been scheduled in particular orbits. This was always the case when ground station coverage (e.g. Cabauw, Sodankylä) had to be optimized in support of validation campaigns.

OCR_ID	Date Start	Date Stop	Orbit Start	Orbit Stop	OCR_Type
OCR_01	10-03-2003	n.a.	5358	n.a.	permanent
OCR_02 test	31-03-2003	08-04-2003	5656	5770	temporary
OCR_02	08-04-2003	n.a.	5771	n.a.	permanent
OCR_03	30-04-2003	01-05-2003	6091	6109	temporary
OCR_05	04-04-2003	n.a.	5711	n.a.	permanent
OCR_06	04-04-2003	n.a.	5711	n.a.	permanent
OCR_07	21-07-2003	n.a.	7267	n.a.	permanent
OCR_08 part 1	26-05-2003	n.a.	6456	n.a.	permanent
OCR_08 part 2	21-07-2003	n.a.	7265	n.a.	permanent
OCR_09*	17-06-2003	17-06-2003	6778	6779	temporary
OCR_09	16-07-2003	16-07-2003	7193	7194	temporary
OCR_10	13-07-2003	13-07-2003	7153	7154	temporary
OCR_11 test*	16-08-2003	18-08-2003	7633	7660	temporary
OCR_11 test*	01-09-2003	03-09-2003	7862	7889	temporary
OCR_11	15-10-2003	n.a.	8489	n.a.	permanent
OCR_12 test	15-04-2004	16-04-2004	11108	11135	temporary
OCR_12	22-05-2004	n.a.	11638	n.a.	permanent
OCR_13 part 1	10-08-2004	10-08-2004	12782	12795	temporary
OCR_13 part 2	12-01-2005	12-01-2005	15002	15015	temporary
OCR_14 part 1	22-03-2004	22-03-2004	10767	10783	temporary
OCR_14 part 2	24-03-2004	24-03-2004	10797	10810	temporary
OCR_16 test	19-04-2004	19-04-2004	11168	11172	temporary
OCR_16	08-06-2004	08-06-2004	11880	11889	temporary
OCR_17 test	23-07-2004	24-07-2004	12525	12552	temporary
OCR_17	06-09-2004	n.a.	13172	n.a.	permanent
OCR_18	14-09-2004	n.a.	13291	n.a.	permanent

* OCR execution failed

Table 1: OCRs issued and implemented 2003-2012

OCR_ID	Date Start	Date Stop	Orbit Start	Orbit Stop	OCR_Type
OCR_19	06-09-2004	n.a.	13172	n.a.	permanent
OCR_20	02-08-2004	09-08-2004	12672	12772	temporary
OCR_21	15-01-2005	n.a.	15054	n.a.	permanent
OCR_22	29-01-2005	23-02-2005	15244	15602	temporary
OCR_23	08-05-2005	30-06-2005	16667	17425	temporary
OCR_24	19-03-2006	15-04-2006	21175	21567	temporary
OCR_25 part 1	06-07-2006	12-07-2006	22734	22821	temporary
OCR_25 part 2	04-08-2006	10-08-2006	23158	23236	temporary
OCR_25 part 3	03-09-2006	08-09-2006	23575	23655	temporary
OCR_25 part 4	02-10-2006	08-10-2006	23994	24076	temporary
OCR_25 part 5	01-11-2006	05-11-2006	24420	24481	temporary
OCR_26	01-10-2006	n.a.	23978	n.a.	permanent
OCR_27	10-10-2006	n.a.	23978	n.a.	permanent
OCR_28	01-09-2006	27-09-2006	23552	23924	temporary
OCR_29	17-04-2007	18-04-2007	26812	26833	temporary
OCR_30*	30-07-2007	31-07-2007	28304	28325	temporary
OCR_30	08-08-2007	09-08-2007	28433	28454	temporary
OCR_31 part 1	11-09-2007	11-09-2007	28917	28920	temporary
OCR_31 part 2	23-01-2008	24-01-2008	30836	30849	temporary
OCR_32	04-11-2007	25-11-2007	29687	29987	temporary
OCR_33	30-06-2008	14-07-2008	33108	33309	temporary
OCR_34	13-05-2008	30-06-2008	32428	33115	temporary
OCR_35	20-04-2008	17-05-2008	32092	32492	temporary
OCR_36 test 1	26-07-2008	26-07-2008	33481	33494	temporary
OCR_36 test 2	24-09-2008	24-09-2008	34339	34353	temporary

* OCR execution failed

Table 1 (continued): OCRs issued and implemented 2003-2012

OCR_ID	Date Start	Date Stop	Orbit Start	Orbit Stop	OCR_Type
OCR_36 test 3	24-10-2008	25-10-2008	34769	34783	temporary
OCR_36	03-11-2008	n.a.	34922	n.a.	permanent
OCR_37 test	20-03-2009	20-03-2009	36873	36876	temporary
OCR_37	25-06-2009	25-06-2009	38261	38266	temporary
OCR_38	14-12-2008	14-12-2008	35499	35505	temporary
OCR_39	04-11-2008	03-12-2008	34940	35341	temporary
OCR_40	09-06-2009	18-07-2009	38038	38596	temporary
OCR_41	01-10-2009	31-10-2009	39664	40106	temporary
OCR_42	01-04-2010	15-05-2010	42269	42913	temporary
OCR_43	16-06-2010	n.a.	43362	n.a.	permanent
OCR_44 part 1	06-08-2010	06-08-2010	44091	44093	temporary
OCR_44 part 2*	09-08-2010	09-08-2010	44134	44136*	temporary
OCR_44 part 2	10-08-2010	10-08-2010	44149	44150	temporary
OCR_45 part 1	19-08-2010	23-08-2010	44275	44339	temporary
OCR_45 part 2	25-08-2010	25-08-2010	44360	44368	temporary
OCR_46	12-06-2010	31-07-2010	43306	44015	temporary
OCR_47	10-08-2010	n.a.	44151	n.a.	permanent
OCR_48	27-10-2010	n.a.	45261	n.a.	permanent
OCR_49	08-12-2010	08-12-2010	45865	45868	temporary
OCR_50	10-01-2011	n.a.	46340	n.a.	permanent
OCR_51 part 1	05-05-2011	05-05-2011	47994	47999	temporary
OCR_51 part 2	10-05-2011	10-05-2011	48069	48074	temporary
OCR_52 part 1	01-01-2012	n.a.	51463	n.a.	permanent
OCR_52 part 2	09-01-2012	n.a.	51578	n.a.	permanent

* OCR execution failed

Table 1 (continued): OCRs issued and implemented 2003-2012