

	Operation Change Request		OCR No: 033
			Issue:
Title: Improved limb coverage during ECOMA-4 NLC Campaign			
<u>Description of Request:</u> During the period June 30 – July 13, 2008 the international rocket campaign ECOMA-4 (Existence and Charge state Of meteoric smoke particles in the Middle Atmosphere) 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 Note 1: This OCR is a re-issue of the original OCR_033 which was withdrawn due to conflicts with the IPY POLARCAT campaigns.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	
<u>Assessment of SSAG (necessary for requests by scientists):</u> 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 coadding 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_033 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
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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
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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 temporarily 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	979,65	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

Seite 10

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
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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
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Total Data Rate (bit/s, including Headers, PMD /Auxiliary Data)							382068

Annex 2:

Coadding index table 02 to 05:

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

Pixel Exposure Time or 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	