 SCIAMACHY	<h2>Operation Change Request</h2>	OCR No: 041 Issue: A
Title: Changing Integration Time for cluster 16 an 18 (channel 3) for 1-31 Oct 2009 to 0.25 or shorter		
<p><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 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 phycoerythrin (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°.</p>		
Originator: Astrid Bracher	Date of Issue: 2009-07-17	Signature: A. Bracher by email 2009-07-17
<p><u>Assessment of SSAG (necessary for requests by scientists):</u> The execution of OCR41 for the time frame 1. - 31.10.2009 is recommended as it improves Chlorophyll retrieval significantly and operational products are not affected.</p>		
SSAG: H. Bovensmann, IFE	Date: 27/07/2009	Signature: via e-mail 27/07/2009
Classification of OCR: D		

OCR Analysis (incl. Implementation Option):

The following analysis is identical to that of OCR_039 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 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. Coadding 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: 20/07/2009	Signature: via e-mail 20/07/2009
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Approval of Proposed Implementation:

Originator Approval: Astrid Bracher	Date: 22/07/2009	Signature: via e-mail 22/07/2009
SSAG Approval: H. Bovensmann	Date: 27/07/2009	Signature: via e-mail 27/07/2009

Decision / Approval:

Shall be implemented as recommended.

DLR Approval: (if necessary NIVR, SPEC) A. Friker	Date: 26/08/2009	Signature: via e-mail 26/08/2009
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Implementation by SOST:

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.

SOST: E.Krieg/M.Gottwald, DLR-IMF	Date: 26/08/2009	Signature: via e-mail 26/08/2009
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Annex 1:

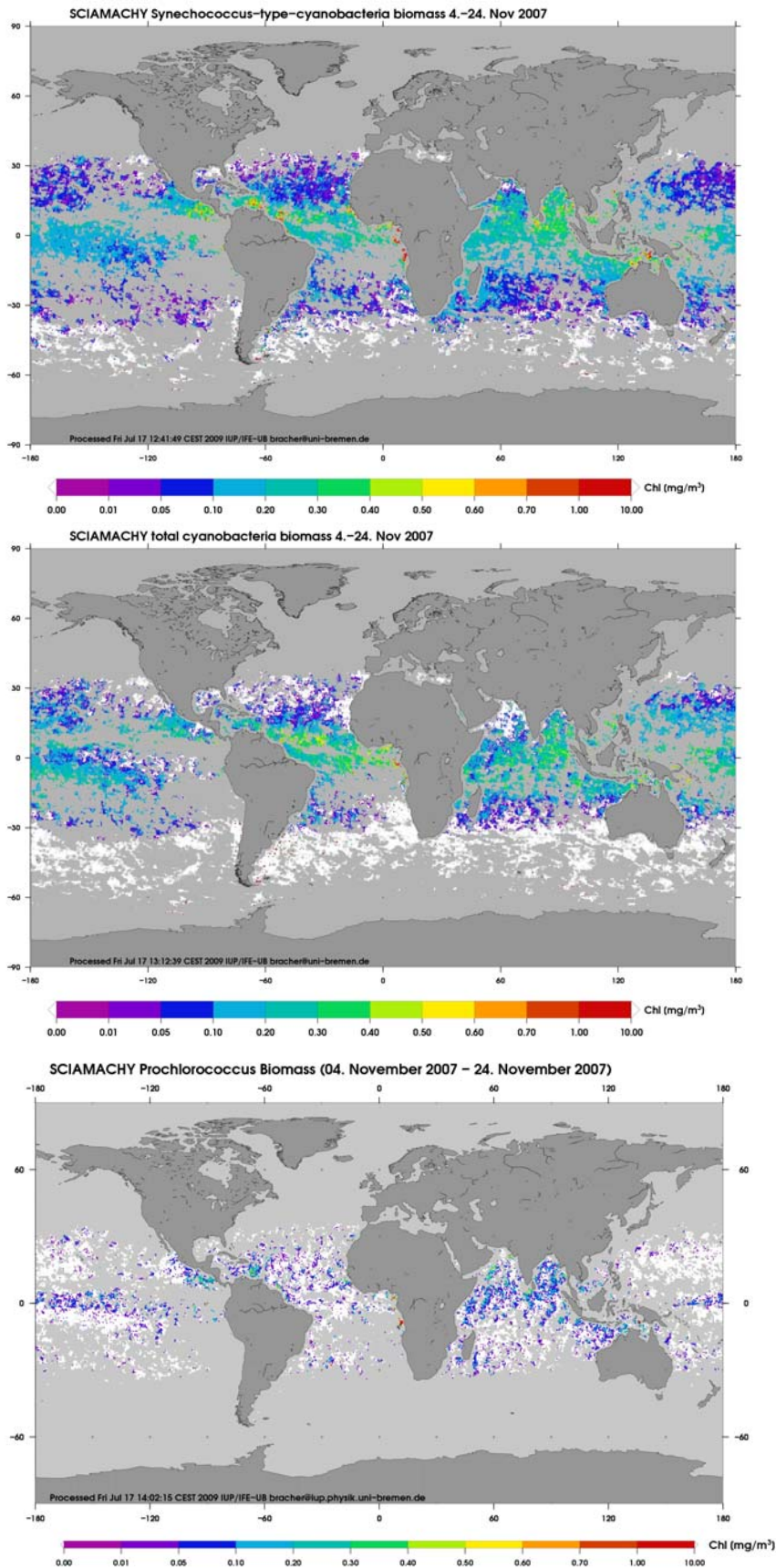


Figure 1: Mean global biomass (in chl-a conc.) of all cyanobacteria (upper panel), Synechococcus-type-cyanobacteria (middle panel) and Prochlorococcus (lower panel) in Nov 2007 (during OCR 32) determined by PhytoDOAS from SCIAMACHY data from Fits within the range of clusters 9, 15, 16, 17 and 18. White 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							
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							
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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.