



MONTHLY OPERATIONS REPORT

MOR#035

Reporting period from 16-Oct-2016 to 15-Nov-2016

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1. Summary

In this reporting period, the majority of the synthesis products showed only small amounts of missing data due to decompression errors and geometric instabilities. Larger impacts were experienced due to automatic recoveries, and a switchover to the on-board primary lane. This was a planned action on November 14, 2016. No transfer frame files were missing during this period, although some late transfers were registered of the raw data.

There were no major issues with the image quality during this reporting period for the radiometric or geometric quality.

Currently a validation of one year of reprocessed data of 'Collection 1' is performed by the VITO science team. After successful validation, the NRT processing will be switched to use the new cloud detection algorithm. This is currently planned on December 5, 2016. At the time of writing the report, July 2015 is being reprocessed onwards at a steady processing rate of 7-8 days of data per day.

During this reporting period we reached the milestone of reaching more than 1000 active PROBA-V users through our PDF distribution channel.

A new product user manual (V2.0) was released on 26/10. It contains changes for collection 1 of the data alongside a variety of other minor updates.

No new developments are expected in the coming period.

2. System Infrastructure

Category	% Up Time	% Down Time
Switches	100.0	0.0
Database Servers	100.0	0.0
Mid Term File Servers	100.0	0.0
Short Term File Servers	100.0	0.0
Master Servers	100.0	0.0
Worker Nodes	99.98	0.02 ^(*)
PDF	100.0	0.0

Table 1: System Infrastructure availability for this reporting period

(*) Worker nodes, 0.02% down due to installing new switch

3. Image Processing Services

3.1. Ingested and archived products

Product Type	Total	Received	Missing data, ingested by VITO	Archived
METEO	248	248	0	248
TFF	310	310	0	310

Table 2: Ingested and archived products for this reporting period

3.2. Generated and archived products

Product Type	Total	Processed	Error	Archived
PROBAV_L1A - Calibration	297	297	0	297
PROBAV_L1A - Nominal	2606	2595	11 ^(*)	2599
PROBAV_L1C	2595	2595	0	2595
PROBAV_L3_S1_TOA_100M	31	31	0	31
PROBAV_L3_S1_TOC_100M	31	31	0	31
PROBAV_L3_S1_TOC_NDVI_100M	31	31	0	31
PROBAV_L3_S5_TOA_100M	6	6	0	6
PROBAV_L3_S5_TOC_100M	6	6	0	6
PROBAV_L3_S5_TOC_NDVI_100M	6	6	0	6
PROBAV_L3_S1_TOA_300M	31	31	0	31
PROBAV_L3_S1_TOC_300M	31	31	0	31
PROBAV_L3_S10_TOC_300M	3	3	0	3
PROBAV_L3_S10_TOC_NDVI_300M	3	3	0	3
PROBAV_L3_S1_TOA_1KM	31	31	0	31
PROBAV_L3_S1_TOC_1KM	31	31	0	31
PROBAV_L3_S10_TOC_1KM	3	3	0	3
PROBAV_L3_S10_TOC_NDVI_1KM	3	3	0	3

Table 3: Generated and archived products for this reporting period

(*) L1A errors: 4 geometric processing, 7 x Error generating L1A



3.3. Backup and archiving service

Product type	Total Files	Total File Size (GB)
TFF	302	778.3
L1A	2807	1394.79
Database transaction logs	2531	712.29
Database incremental back-up	188	256.61
Database full back-up	27	1150.12

Table 4: Back-up data volumes for this reporting period

Product type	Total Files	Total File Size (GB)
PROBAV_TRANSFERFRAMES	2393	6320.98
PROBAV_L1A	29149	15067.58
PROBAV_L1C	33909	37972.65
PROBAV_L3_S1_TOA_100M	104	2943.33
PROBAV_L3_S1_TOC_100M	100	2843.25
PROBAV_L3_S1_TOC_NDVI_100M	100	320.47
PROBAV_L3_S5_TOA_100M	20	2079.26
PROBAV_L3_S5_TOC_100M	21	2242.20
PROBAV_L3_S5_TOC_NDVI_100M	20	239.63
PROBAV_L3_S1_TOA_300M	106	1316.84
PROBAV_L3_S1_TOC_300M	101	1277.90
PROBAV_L3_S10_TOC_300M	10	205.20
PROBAV_L3_S10_TOC_NDVI_300M	10	18.37
PROBAV_L3_S1_TOA_1KM	106	173.76
PROBAV_L3_S1_TOC_1KM	106	174.81
PROBAV_L3_S10_TOC_1KM	10	27.68
PROBAV_L3_S10_TOC_NDVI_1KM	10	2.26
ICP_GEOMETRIC_CENTRE	0	0
ICP_GEOMETRIC_LEFT	0	0
ICP_GEOMETRIC_RIGHT	0	0
ICP_RADIOMETRIC_CENTRE	0	0
ICP_RADIOMETRIC_LEFT	0	0
ICP_RADIOMETRIC_RIGHT	0	0
METEO_ECMWF	248	0.31
METEO_METEOSERVICES	244	1.30
POLARMOTION	1	0.00

Table 5: Archived data volumes for this reporting period

3.4. Dissemination service

Product type	Added to catalogue	Ordered	Delivered
PROBAV_L1C	2590	129	269
PROBAV_L3_S1_TOA_100M	31	339	308
PROBAV_L3_S1_TOC_100M	31	3136	1554
PROBAV_L3_S1_TOC_NDVI_100M	31	952	941
PROBAV_L3_S5_TOA_100M	6	42	36
PROBAV_L3_S5_TOC_100M	6	489	469
PROBAV_L3_S5_TOC_NDVI_100M	6	1253	1292
PROBAV_L3_S1_TOA_300M	31	567	635
PROBAV_L3_S1_TOC_300M	31	1806	2816
PROBAV_L3_S10_TOC_300M	3	41	61
PROBAV_L3_S10_TOC_NDVI_300M	3	104	1486
PROBAV_L3_S1_TOA_1KM	31	166	170
PROBAV_L3_S1_TOC_1KM	31	223	225
PROBAV_L3_S10_TOC_1KM	3	131	136
PROBAV_L3_S10_TOC_NDVI_1KM	3	512	756

Table 6: Ordered and delivered products for this reporting period

3.5. End-user activity

27 new user(s) were registered in this reporting period.

The total number of users registered for PROBA-V data and that have ordered data is **1003** with **103** different nationalities representing **764** different companies/universities.

Product type	Africa	Asia	Europe	N-America	Oceania	S-America
PROBAV_L1C	0	58.83	327.52	0	0	0
PROBAV_L3_S1_TOA_100M	0	0	127.37	0	0	79.59
PROBAV_L3_S1_TOC_100M	0	655.11	1562.18	741.16	0	36.73
PROBAV_L3_S1_TOC_NDVI_100M	19.65	0	0.54	0	0	0.08
PROBAV_L3_S5_TOA_100M	0	0	5.64	0	0	5.13
PROBAV_L3_S5_TOC_100M	17.87	0.41	25.71	0.83	0	33.57
PROBAV_L3_S5_TOC_NDVI_100M	542.46	1361.31	1.56	0.15	0	1.37
PROBAV_L3_S1_TOA_300M	0	3.05	2014.82	0	0	7.18
PROBAV_L3_S1_TOC_300M	0.05	0.01	1468.19	329.06	0	0
PROBAV_L3_S10_TOC_300M	4.36	2.47	200.67	0	1.28	0.36
PROBAV_L3_S10_TOC_NDVI_300M	0.00	0.88	1.77	25.92	0	0.41
PROBAV_L3_S1_TOA_1KM	0	0.00	197.26	0	0	0.17

PROBAV_L3_S1_TOC_1KM	0.00	0	237.59	0	0	0
PROBAV_L3_S10_TOC_1KM	0.63	0.02	49.39	0.82	0	0
PROBAV_L3_S10_TOC_NDVI_1KM	0	9.76	5.95	0	0	0.52

Table 7: Data download (GB) in total per Origin of the User for the reporting period

Product Type	Global
L1C	386.35
PROBAV_L3_S1_TOA_100M	206.96
PROBAV_L3_S1_TOC_100M	2995.18
PROBAV_L3_S1_TOC_NDVI_100M	20.28
PROBAV_L3_S5_TOA_100M	10.77
PROBAV_L3_S5_TOC_100M	78.39
PROBAV_L3_S5_TOC_NDVI_100M	1906.85
PROBAV_L3_S1_TOA_300M	2025.05
PROBAV_L3_S1_TOC_300M	1797.32
PROBAV_L3_S10_TOC_300M	209.14
PROBAV_L3_S10_TOC_NDVI_300M	28.97
PROBAV_L3_S1_TOA_1KM	197.43
PROBAV_L3_S1_TOC_1KM	237.59
PROBAV_L3_S10_TOC_1KM	50.86
PROBAV_L3_S10_TOC_NDVI_1KM	16.24

Table 8: Data download (GB) in total for the reporting period

Company	# Downloads
VITO	1678
METEO FRANCE	1423
DEVELOPMENT SEED	1363
SASSCAL	1109
UNIVERSITY OF LEICESTER	544
GOOGLE	534
UIUC	522
ARID LAND RESEARCH CENTER	395
GIS	384
OSS	372

Table 9: Top 10 user companies for the reporting period

Country	# Users
CHINA	95
BELGIUM	90
ITALY	53
BRAZIL	45
FRANCE	43
UNITED STATES	42
UNITED KINGDOM	42
INDIA	36
NETHERLANDS	35
GERMANY	32

Table 10: Top 10 countries with most registered users

List of issues raised by users:

ProbaV:

- * Commercial use of PROBA data
- * Proba satellite: how to access to VNIR imagery taken by Proba
- * Access for research (Caballero)
- * No data available since 16/10/2016
- * Problem in India Administration Layer

4. Image Calibration services

4.1. Radiometric Calibration

Calibration request type	Total	Processed	Not received	Error
CLOUDS	18	18	0	0
DARK CURRENT	23	23	0	0
MOON	3	2	1	0
RAYLEIGH	56	55	1	0
SNOW	0	0	0	0
SUN_GLINT	0	0	0	0

Table 11: Calibration Image requests for this reporting period

Calibration image type	Total	Valid	Invalid (*)
PROBA_V_L1A_CALIBRATION	3	3	0
PROBA-V_L1B_CALIBRATION	294	260	28
PROBA-V_L1B_INTERSECTION	719	375	344
PROBA-V_L1B_OVERLAPREGION	0	0	0

Table 12: Processed calibration images for this reporting period

(*) Due to insufficient overlap with the calibration region of interest, not enough pixels (e.g. clouds contamination), site not sufficiently uniform (illumination), etc.

Long-term monthly Libya-4 mean plots for different cameras are given in Figure 1, Figure 2 and Figure 3. Deep convective clouds interband calibration results are given in Figure 4.

A slight decrease is observed in the DCC interband calibration results for LEFT and CENTER BLUE and CENTER and RIGHT NIR. This will be investigated in more detail in order to evaluate the need for an update of the absolute calibration coefficients for these bands.

We noticed that the foreseen update for October 2016 (Dark current update and application of the linear degradation model to the SWIR absolute calibration coefficients) was not applied. This will be corrected for in the reprocessing.

Radiometric ICP file

ICP dark values will be updated in the coming days and the SWIR absolute calibration coefficients will be updated following the linear degradation model.

The current ICP files are

- PROBAV_ICP_RADIOMETRIC#LEFT_20160927_V01
- PROBAV_ICP_RADIOMETRIC#CENTER_20160927_V01
- PROBAV_ICP_RADIOMETRIC#RIGHT_20160927_V01

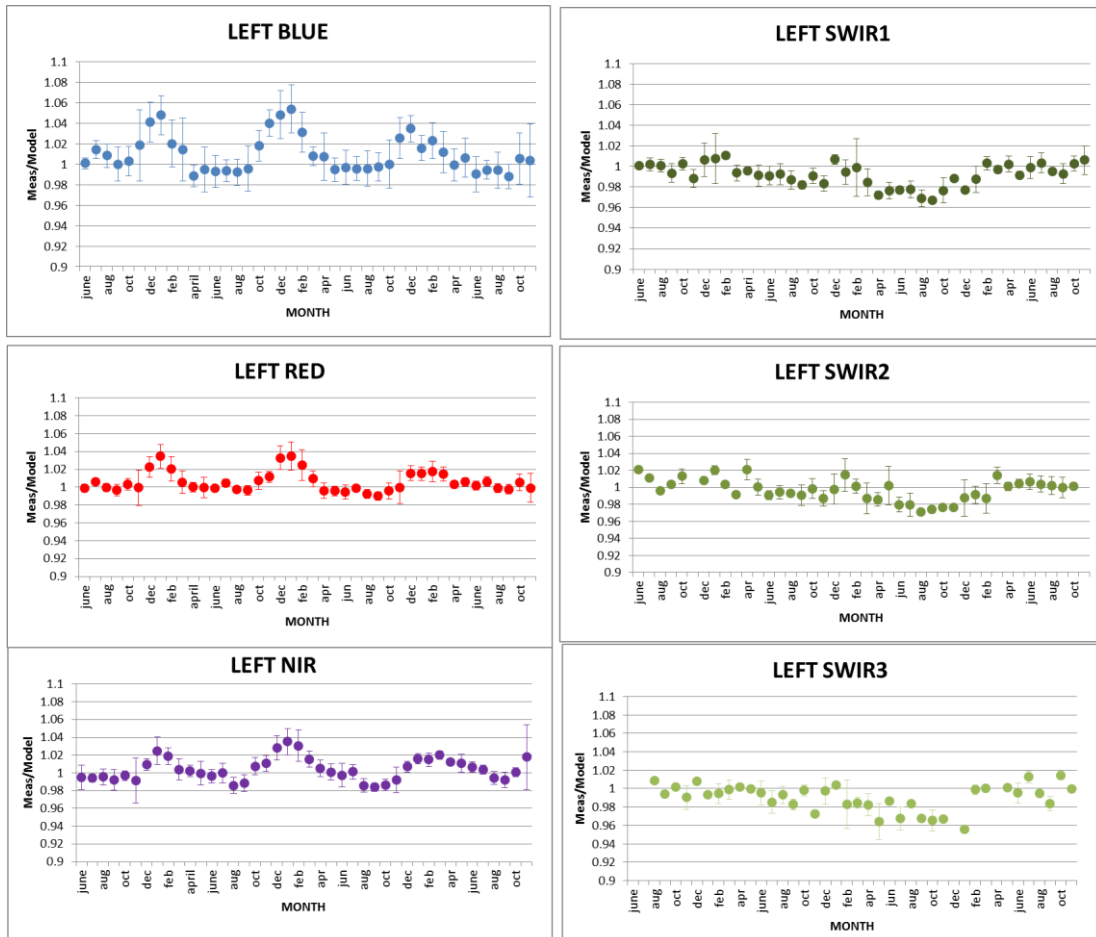


Figure 1. Libya-4 desert calibration results: LEFT monthly averaged results

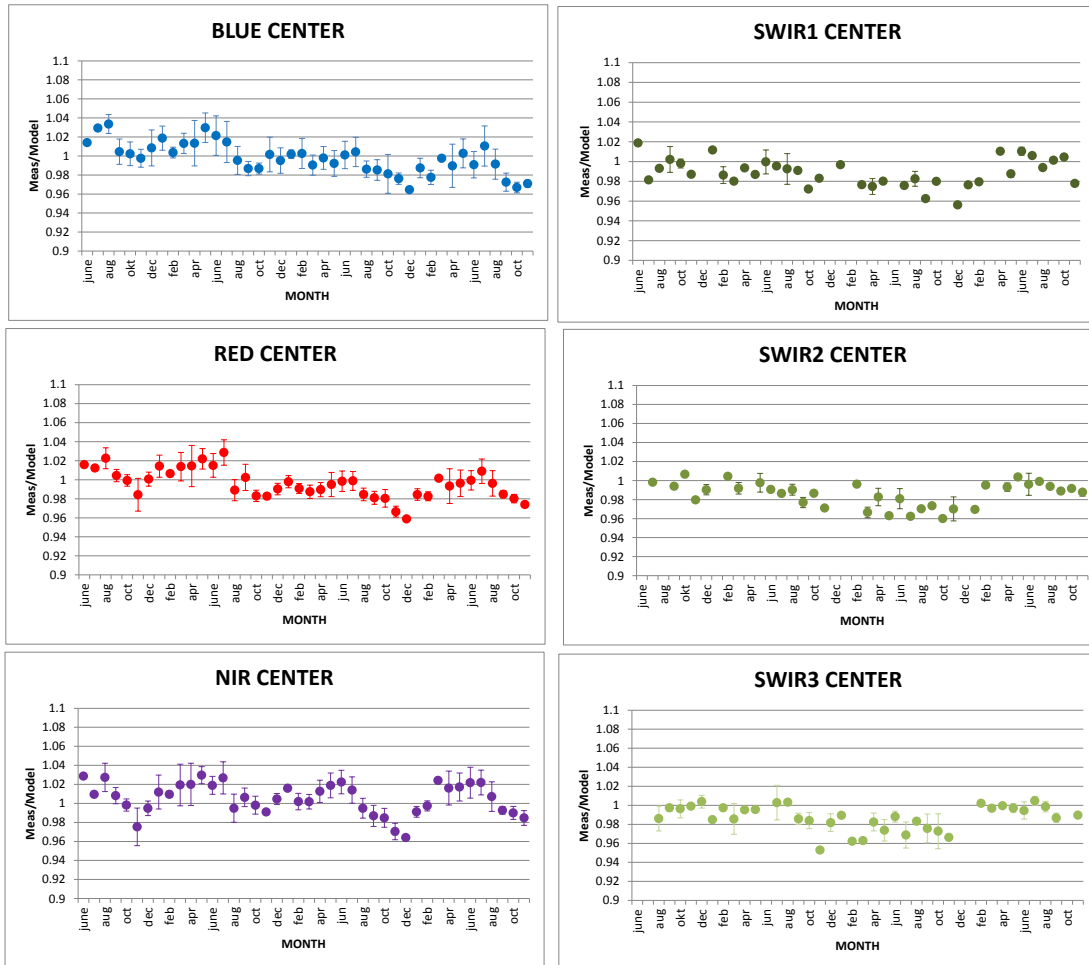


Figure 2. Libya-4 desert calibration results: CENTER monthly averaged results

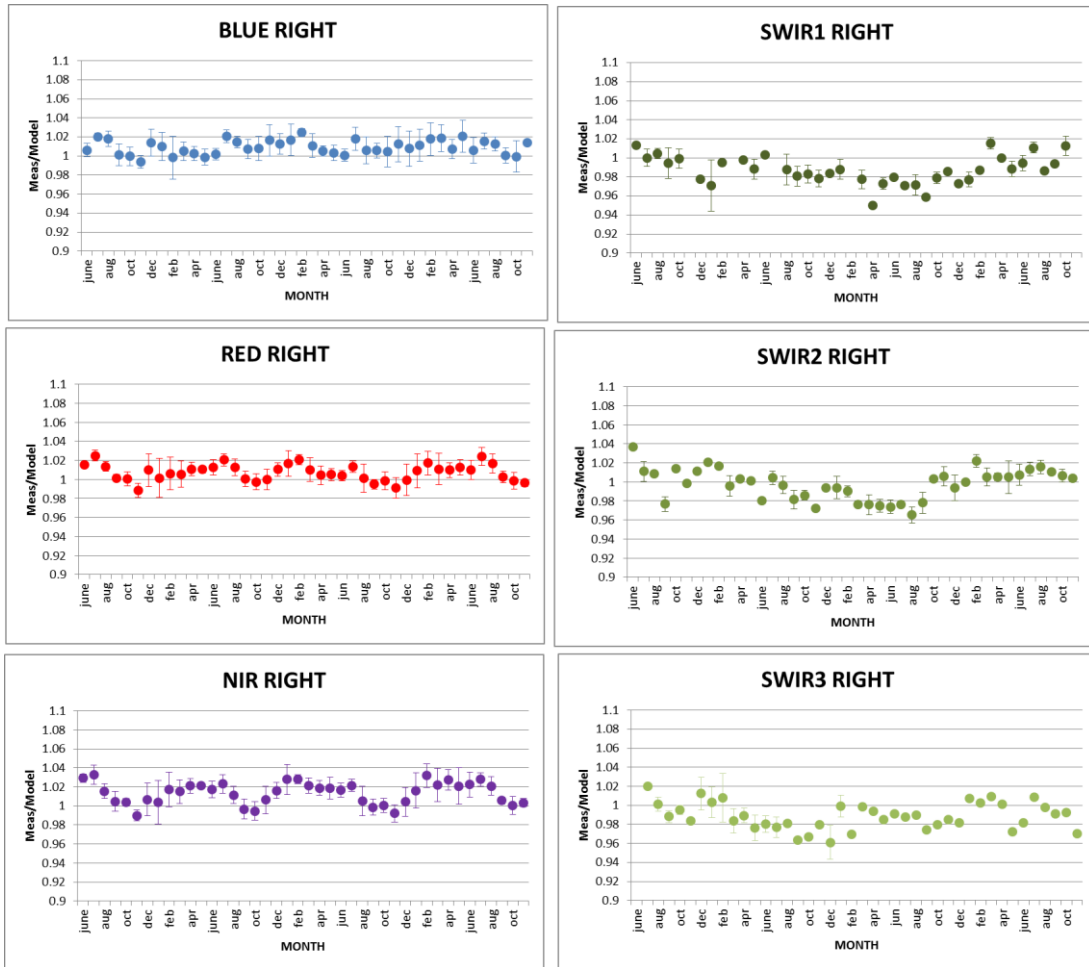


Figure 3. Libya-4 desert calibration results: RIGHT monthly averaged results

4.2. Geometric Calibration

Calibration image type	Total	Processed	Error
PROBA-V_L1C_INTERSECTION	14100	14100	0

Table13: Processed calibration images for this reporting period

During previous month, the average ALE was < 80 m ($\sigma < 91$ m). It is noted that these statistics were obtained over 29 days instead of the expected 31, because of a limited number of GCP points and no data available on 30/10 and 31/10, respectively.

Therefore for this reporting period the daily ALE evolution plot is shown as two separate periods, from 15/10 – 29/10 (Figure 5) and from 1/11 – 15/11 (Figure 6). The plots show peaks at 1/11 and 6/11, with maximum values for the BLUE channel of 105 m and 114 m, respectively. After the latter peak, daily values first decrease to 65 – 70 m, but increase again towards 85 – 95 m at the end of the period.

The geometric accuracy was within the requirement of < 300 m, with an average compliance for all cameras of 99.2%. Daily values were stable and above 99% until 29/10, but decreased to $< 98\%$ for the BLUE and RED channels in concert with the ALE maxima. By the end of the period, values had increased to 98.6 (BLUE) – 99.7% (SWIR).

Figure 5: Daily ALE evolution for all PROBA-V spectral bands for 16/10 – 29/10 and 1/11 – 15/11 (Figure 6)

Geometric ICP file

- PROBAV_ICP_GEOMETRIC#LEFT_20160907_V01
- PROBAV_ICP_GEOMETRIC#CENTER_20160907_V01
- PROBAV_ICP_GEOMETRIC#RIGHT_20160907_V01

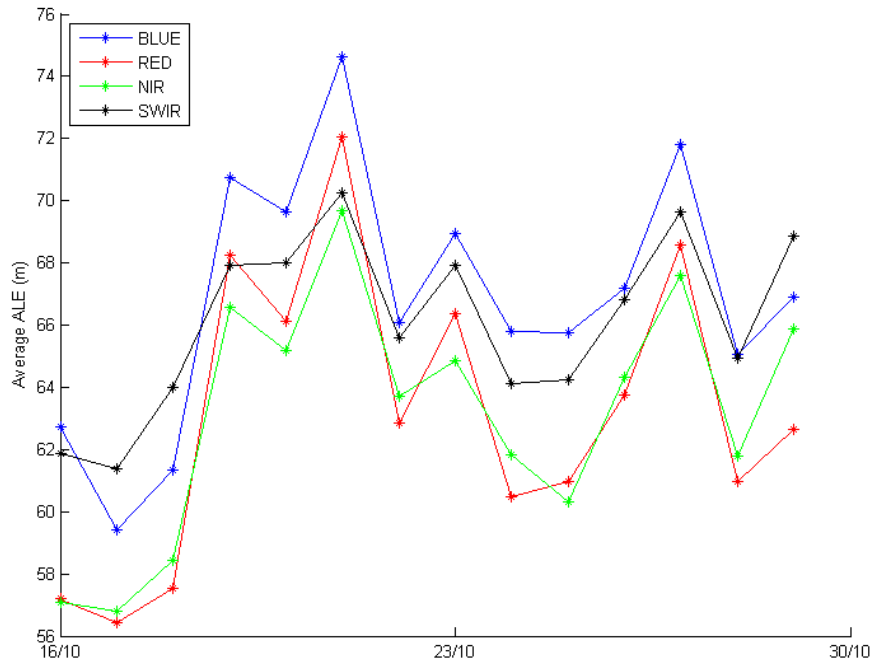


Figure 5 - Daily ALE evolution for all PROBA-V spectral bands for period 16/10 -29/10

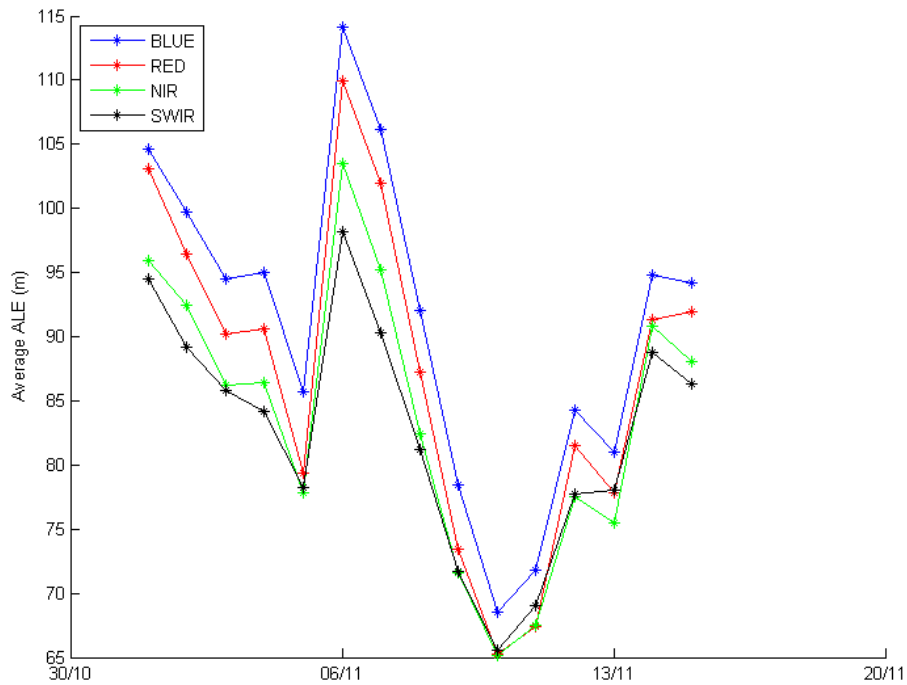


Figure 6 - Daily ALE evolution for all PROBA-V spectral bands for period 01/11 - 15/11

5. Anomalies

5.1. System related issues

A detailed description of each issue is available in the issue tracking system <http://jira.vgt.vito.be>

Key	Summary	Status	Created	Component/s
PROBAVUS-7	Very small images fail to process	Resolved	10/01/2014	General
PROBAVUS-60	LTDA Restore fails when product destination already exists on disk	Open	22/01/2016	Software
PROBAVUS-63	Cloud shadow detection at high solar zenith angles not working properly	Open	11/05/2016	Software
PROBAVUS-65	Processing statuses L2 products	Open	16/09/2016	Software
PROBAVUS-66	Cloud cover percentages on PDF products are not reliable	Open	19/10/2016	PDF

- 1 new issue was logged during this reporting period
- 0 issue(s) was resolved and closed during this reporting period
- 0 issue(s) are resolved but remain to be closed formally
- 1 issue is resolved but remain in the list logging purposes
- 4 issues are open and remain to be solved

5.2. Image processing issues

A detailed description of each issue is available in the Weekly Report and the image processing tracking system <https://juniper.vgt.vito.be/ciptools>

The below table gives an overview of the S1's of this reporting period:

	# S1	Dates
Major Gaps (> 21600 km² (missing TFF))	2	14/11, 29/10
Large Gaps (< 21600 km²)	0	
Medium Gaps (< 10000 km²)	3	04/11, 15/11, 18/10
Minor Gaps (< 3600 km²)	4	12/11, 07/11, 24/10, 13/11
Negligible Gaps (< 1000 km²)	20	01/11, 06/11, 11/11, 20/10, 25/10, 02/11, 05/11, 10/11, 31/10, 30/10, 21/10, 26/10, 28/10, 09/11, 22/10, 19/10, 27/10, 03/11, 08/11, 23/10
Complete synthesis (no gaps)	2	16/10, 17/10

Table14: Overview of S1 for this reporting period

Synthesis	Missing	Decom. Error	Geom. Error	Missing TFF	Autom. Recovery	VC4 Missing	Create Contours	Other
20161016	0.32%							1
20161017	1.02%							
20161018	3.47%	9	5		2		1	
20161019	2.09%		5					
20161020	2.66%	3	5					
20161021	0.02%	2	1					
20161022	0.05%		6					
20161023	0.01%		6					
20161024	0.44%	4	3		1	1		
20161025	0.03%	2	5					
20161026	0.63%		3					
20161027	0.85%	1						
20161028	2.07%	3	3					
20161029	17.63%	4	4		1			
20161030	2.96%		2					
20161031	4.12%	4	1					
20161101	0.09%	1	7					
20161102	0.16%	1	6					
20161103	0.25%	4	7			1		1
20161104	2.90%	3	8		1			
20161105	0.16%	1	16					
20161106	0.10%		7					
20161107	1.26%	4	10		1		1	
20161108	0.70%	2	7					
20161109	2.13%	2	17					
20161110	2.25%		4					
20161111	0.45%		4					
20161112	0.85%	1	12			1		
20161113	4.53%	6	7		1	1		
20161114	23.07%	23	8		1	1	2	
20161115	3.03%	39	7					

Table 15: List of synthesis with an error overview of the missing percentages and errors for this reporting period

6. Scheduled activities for the next period(s)

- Software upgrades:
No software upgrades planned
- Hardware:
After the reprocessing of Collection 1 data, worker nodes will be used to change out the oldest servers in the nominal production chain.
- Development:
No developments planned.
- After validation of 1 year of reprocessed data (collection 1), the NRT production will be switched. Expectation is that this switch can happen on December 5, 2016.

7. Operational remarks

Reprocessing activities are ongoing for Collection 1. Due to an error in the surface background maps of November that are being used in the new cloud detection algorithm, the reprocessing of November 2013 and 2014 had to be re-initiated. This delayed the overall reprocessing schedule. At the time of writing, data from July 2015 is being reprocessed, and the overall reprocessing pace is about 8 days of data in one day. Expectation is that all products will be reprocessed to Collection 1 by end of January 2017.

On Monday 14/11, a planned switch to the primary on-board lane was planned to further investigate the decompression errors that occur on a daily basis. On November 17, a switch to the redundant lane was performed again. Therefore, a substantial amount of data was missing on these two dates.