



MONTHLY OPERATIONS REPORT

MOR#075

Reporting period from 16-Feb-2020 to 15-Mar-2020

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1. Summary

Due to the current CIVID-19 outbreak, Belgium is currently in lockdown, meaning that everyone in non-crucial sectors is obliged to work from home. VITO took the necessary measurements so that the PROBA-V operations are not interrupted and that everything can be followed up from home. Exception on this rule is that we have one system administrator on site to intervene in case of an unplanned downtime. So, service levels can be guaranteed at the time of writing.

In this reporting period, the majority of the synthesis products were nearly complete. Three missing transfer frame files and six automatic recoveries were recorded with impact on synthesis products. The amount of geometric errors is gradually decreasing (seasonal effect), but the actual impact of these type of errors is very limited on the daily products. The actual reported missing percentage of pixels was estimated too high and a refactoring of this algorithm and scripting was done to reflect values that are closer to reality. <http://www.vito-eodata.be/missingpixels/> contains now a split between the impact of geometric and decompression errors on the daily products. The missing % of pixels contains the other categories. This will also be refactored during the reprocessing to Collection 2, scheduled later this year.

In terms of radiometric processing, a correlation is again observed between the increase in the DCC NIR interband calibration results over the last months and an increase in the temperature. The desert calibration results show for the VNIR bands a stronger seasonal trend than in previous years. Furthermore a lot of scattering is observed in Libya-4 results for the LEFT SWIR3 strip and the RIGHT SWIR1 strip. Both trends might be related to BRDF related changes due to the orbital drift. This is currently still under investigation.
On the absolute location error, no anomalies are detected in the last month.

16 new users registered, and more than 11 TB was distributed over the last month.

Tests are ongoing on a new cloud masking algorithm for all resolutions in development environment in preparation for 'Collection 2' of the data.

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	100.0	0.0
PDF	100.0	0.0

Table 1: System Infrastructure availability for this reporting period

3. Image Processing Services

3.1. Ingested and archived products

Product Type	Total	Received	Missing data, ingested by VITO	Archived
METEO	232	232	0	232
TFF	290	287	3 ^(*)	287

Table 2: Ingested and archived products for this reporting period

(*) TFF 23691 and TFF 23578: antenna problems, TFF 23655: no data missing, satellite performed an autonomous reconfiguration

3.2. Generated and archived products

Product Type	Total	Processed	Error	Archived
PROBAV_L1A - Calibration	236	236	0	236
PROBAV_L1A - Nominal	2485	2484	1 ^(*)	2485
PROBAV_L1C	2484	2484	0	2484
PROBAV_L2A_100M	886	886	0	886
PROBAV_L2A_300M	2484	2484	0	2484
PROBAV_L2A_1KM	2484	2484	0	2484
PROBAV_L3_S1_TOA_100M	29	29	0	29
PROBAV_L3_S1_TOC_100M	29	29	0	29
PROBAV_L3_S1_TOC_NDVI_100M	29	29	0	29
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	29	29	0	29
PROBAV_L3_S1_TOC_300M	29	29	0	29
PROBAV_L3_S10_TOC_300M	3	3	0	3
PROBAV_L3_S10_TOC_NDVI_300M	3	3	0	3
PROBAV_L3_S1_TOA_1KM	29	29	0	29
PROBAV_L3_S1_TOC_1KM	29	29	0	29
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

(*) 1 * L1A error due geometric error

3.3. Backup and archiving service

Product type	Total Files	Total File Size (GB)
TFF	282	750.71
L1A	2677	1363.67
Database transaction logs	768	64.7
Database incremental back-up	36	8.73
Database full back-up	14	830.35

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

Product type	Total Files	Total File Size (GB)
PROBAV_TRANSFERFRAMES	247	713.52
PROBAV_L1A	2364	1301.87
PROBAV_L1C	2160	2556.54
PROBAV_L2A_100M	1766	1577.18
PROBAV_L2A_300M	5009	817.71
PROBAV_L2A_1KM	5008	106.15
PROBAV_L3_S1_TOA_100M	57	1587.60
PROBAV_L3_S1_TOC_100M	58	1438.48
PROBAV_L3_S1_TOC_NDVI_100M	59	160.18
PROBAV_L3_S5_TOA_100M	12	1244.13
PROBAV_L3_S5_TOC_100M	12	1174.32
PROBAV_L3_S5_TOC_NDVI_100M	12	122.73
PROBAV_L3_S1_TOA_300M	59	738.82
PROBAV_L3_S1_TOC_300M	59	680.65
PROBAV_L3_S10_TOC_300M	6	122.55
PROBAV_L3_S10_TOC_NDVI_300M	6	9.90
PROBAV_L3_S1_TOA_1KM	59	96.59
PROBAV_L3_S1_TOC_1KM	59	89.23
PROBAV_L3_S10_TOC_1KM	6	16.35
PROBAV_L3_S10_TOC_NDVI_1KM	6	1.23
ICP_GEOMETRIC_CENTRE	0	0
ICP_GEOMETRIC_LEFT	0	0
ICP_GEOMETRIC_RIGHT	0	0
ICP_RADIOMETRIC_CENTRE	2	0.08
ICP_RADIOMETRIC_LEFT	2	0.08
ICP_RADIOMETRIC_RIGHT	2	0.08
METEO_ECMWF	200	0.25
METEO_METEOSERVICES	200	1.07
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	2505	3	134
PROBAV_L2A_100M	865	0	6
PROBAV_L2A_300M	2505	0	5
PROBAV_L2A_1KM	2505	0	0
PROBAV_L3_S1_TOA_100M	29	120	141
PROBAV_L3_S1_TOC_100M	29	2361	1124
PROBAV_L3_S1_TOC_NDVI_100M	29	0	32
PROBAV_L3_S5_TOA_100M	6	361	358
PROBAV_L3_S5_TOC_100M	6	367	367
PROBAV_L3_S5_TOC_NDVI_100M	6	893	905
PROBAV_L3_S1_TOA_300M	29	93	97
PROBAV_L3_S1_TOC_300M	29	112	181
PROBAV_L3_S10_TOC_300M	3	170	170
PROBAV_L3_S10_TOC_NDVI_300M	3	229	380
PROBAV_L3_S1_TOA_1KM	29	78	85
PROBAV_L3_S1_TOC_1KM	29	58	99
PROBAV_L3_S10_TOC_1KM	3	93	96
PROBAV_L3_S10_TOC_NDVI_1KM	3	576	608

Table 6: Ordered and delivered products for this reporting period

3.5. End-user activity

16 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 **1777** with **121** different nationalities representing **1294** different companies/universities.

Product type	Africa	Asia	Europe	N- America	Oceania	S- America
PROBAV_L1C	0	174.11	7.40	0	0	0
PROBAV_L2A_100M	0	0	0.16	7.57	0	0
PROBAV_L2A_300M	0	0	0.86	0	0	0
PROBAV_L2A_1KM	0	0	0	0	0	0
PROBAV_L3_S1_TOA_100M	0	10.00	1403.98	0.65	0	0
PROBAV_L3_S1_TOC_100M	0.62	43.95	3200.31	506.94	0	0
PROBAV_L3_S1_TOC_NDVI_100M	0.07	0	0.06	1.48	0	0
PROBAV_L3_S5_TOA_100M	0	0	0	0.20	0	0
PROBAV_L3_S5_TOC_100M	17.50	1.05	0	0.21	0	0
PROBAV_L3_S5_TOC_NDVI_100M	0.00	0	3676.16	0.36	0	0.88
PROBAV_L3_S1_TOA_300M	209.79	0.00	634.16	0	0	0
PROBAV_L3_S1_TOC_300M	0	2.68	752.01	242.87	0	0
PROBAV_L3_S10_TOC_300M	2.12	0	128.76	0	0	0
PROBAV_L3_S10_TOC_NDVI_300M	0.00	0.40	9.29	0	0	0.06
PROBAV_L3_S1_TOA_1KM	0	1.11	91.77	0.00	0	0
PROBAV_L3_S1_TOC_1KM	0	0.01	122.46	0	0	0
PROBAV_L3_S10_TOC_1KM	0.59	0	8.85	8.83	0	0
PROBAV_L3_S10_TOC_NDVI_1KM	0.13	43.13	0.00	0	0	0.01

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



Product Type	Global
L1C	181.51
PROBAV_L2A_100M	7.72
PROBAV_L2A_300M	0.86
PROBAV_L2A_1KM	0
PROBAV_L3_S1_TOA_100M	1414.63
PROBAV_L3_S1_TOC_100M	3751.81
PROBAV_L3_S1_TOC_NDVI_100M	1.60
PROBAV_L3_S5_TOA_100M	0.20
PROBAV_L3_S5_TOC_100M	18.76
PROBAV_L3_S5_TOC_NDVI_100M	3677.40
PROBAV_L3_S1_TOA_300M	843.95
PROBAV_L3_S1_TOC_300M	997.55
PROBAV_L3_S10_TOC_300M	130.88
PROBAV_L3_S10_TOC_NDVI_300M	9.76
PROBAV_L3_S1_TOA_1KM	92.88
PROBAV_L3_S1_TOC_1KM	122.46
PROBAV_L3_S10_TOC_1KM	18.27
PROBAV_L3_S10_TOC_NDVI_1KM	43.27

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

Company	# Downloads
SAN JOSE STATE UNIVERSITY	1077
-	670
UNIVERSITY OF COPENHAGEN	352
NEIGAE,CAS	346
VITO	255
BAYANNUR METEOROLOGICAL BUREAU	243
UPMC	242
PARC NATIONAL DE LA VANOISE	224
IGSNRR CAS	222
DESCARTES UNDERWRITING	158

Table 9: Top 10 user companies for the reporting period

Country	# Users
CHINA	182
BELGIUM	156
INDIA	84
FRANCE	83
BRAZIL	81
UNITED STATES	79
ITALY	74
NETHERLANDS	60
UNITED KINGDOM	60
GERMANY	56

Table 10: Top 10 countries with most registered users

List of issues raised by users:

reboot epod 81 and 33
Nieuw tijdelijk docker image op de cluster
Quota
docker container error, maar job nog RUNNING
psycopg2 wheel file
stale file handle netapp03vlan213.vgt.vito.be:/c3s_vol4
(application_1583479828890_0654/)
X2go connectie
Probleem resource allocation application_1583479828890_0183
Resources on MEP
PDF: (API) - 2020/3/5 - PROBA-V Mission Exploitation Platform - Shapefile upload
Aborted job: application_1583239935789_1466
Consulta
local spark submit
Abort application_1581979544130_19986
PDF: PROBA-V 100 M products (older than 1 month) - L2A - 100 m [C1] Antarctica -
Azubuike Okorie - 2020/2/25 - How to read data in hdf5 file format
run docker form yarn
Jobs falen voortdurend...
Welcome to PROBA-V GBAMRA AKOUNDA
add wheel to jenkins slaves
add users to group
terrascope mep vm onbereikbaar op VITONET wifi
problems accessing disks on mep

4. Image Calibration services

4.1. Radiometric Calibration

Calibration request type	Total	Processed	Not received	Error
CLOUDS	17	14	3	0
DARK CURRENT	22	19	3	0
MOON	2	2	0	0
RAYLEIGH	52	44	7	1
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	2	2	0
PROBA-V_L1B_CALIBRATION	234	172	60
PROBA-V_L1B_INTERSECTION	761	364	397
PROBA-V_L1B_OVERLAPREGION	0	0	0

Table 12: Processed calibration images for this reporting period

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

A correlation is again observed between the increase in the DCC NIR interband calibration results over the last months and an increase in the temperature.

The desert calibration results show for the VNIR bands a stronger seasonal trend than in previous years. Furthermore a lot of scattering is observed in Libya-4 results for the LEFT SWIR3 strip and the RIGHT SWIR1 strip. Both trends might be related to BRDF related changes due to the orbital drift. This is currently still under investigation.

3 new bad pixels were identified all in the CENTER SWIR3 strip:

CENTER SWIR3 Pixel ID 413 (0-based), Pixel ID 550 (0-based), Pixel ID 565 (0-based)

Radiometric ICP file

The BLUE LEFT/CENTER absolute calibration coefficients will be updated following a linear degradation model. Furthermore the dark currents will be updated and three bad pixel will be added: CENTER SWIR3 Pixel ID 413 (0-based), Pixel ID 550 (0-based), Pixel ID 565 (0-based).

The current ICP files are

- PROBAV_ICP_RADIOMETRIC#LEFT_20200301_V01
- PROBAV_ICP_RADIOMETRIC#CENTER_20200301_V01
- PROBAV_ICP_RADIOMETRIC#RIGHT_202000301_V01

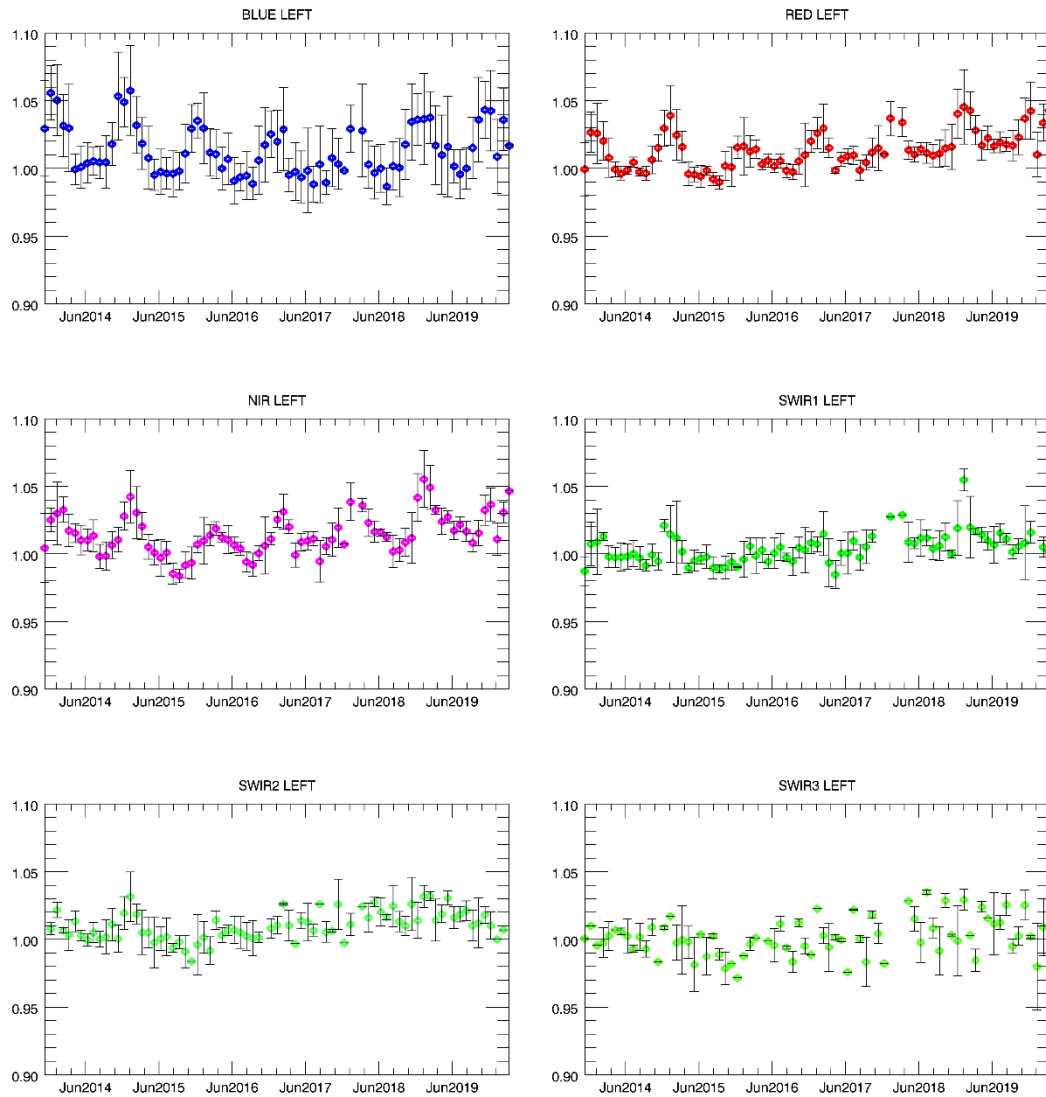


Figure 1. Libya-4 desert calibration results: LEFT monthly averaged results (collection 1)

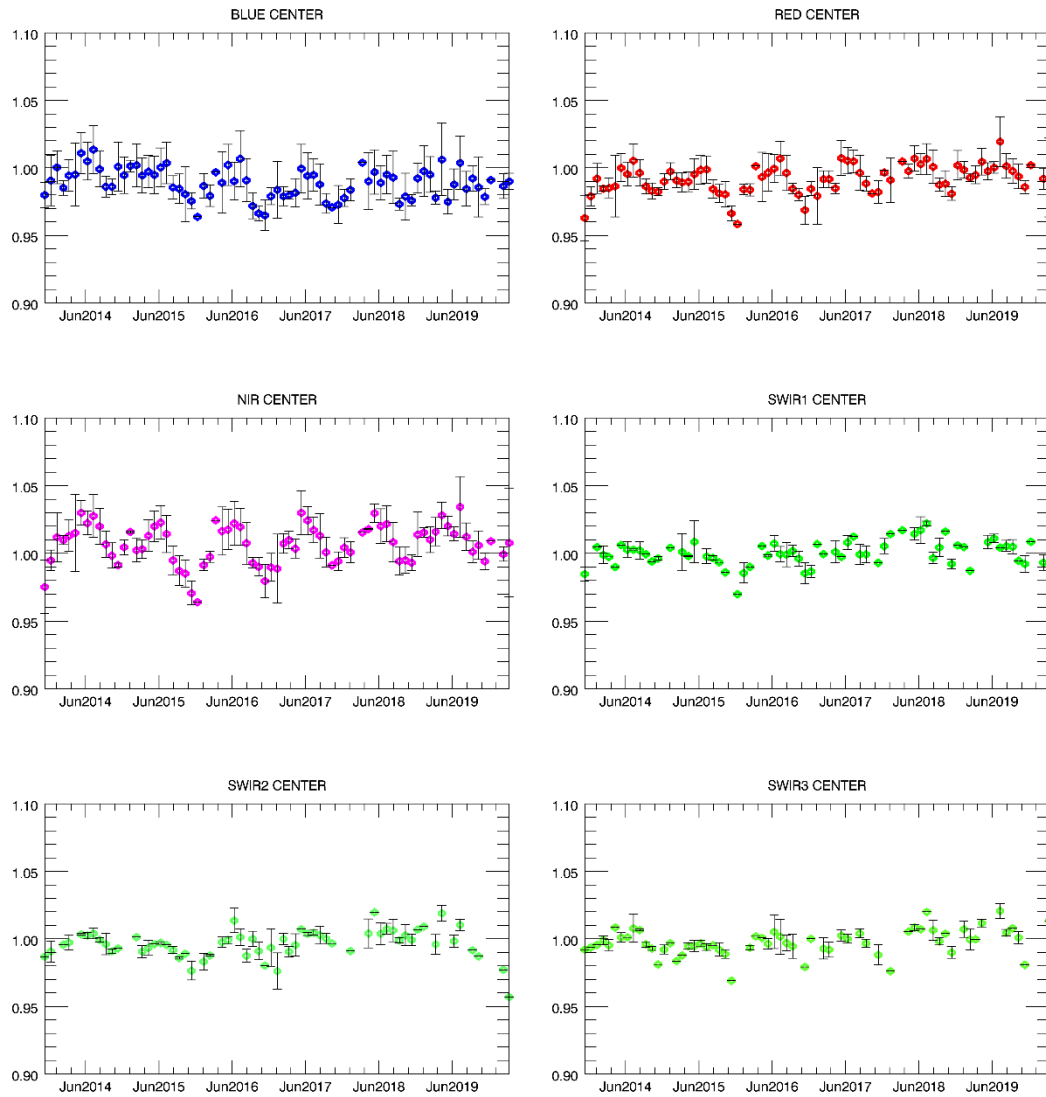


Figure 2. Libya-4 desert calibration results: CENTER monthly averaged results (collection 1)

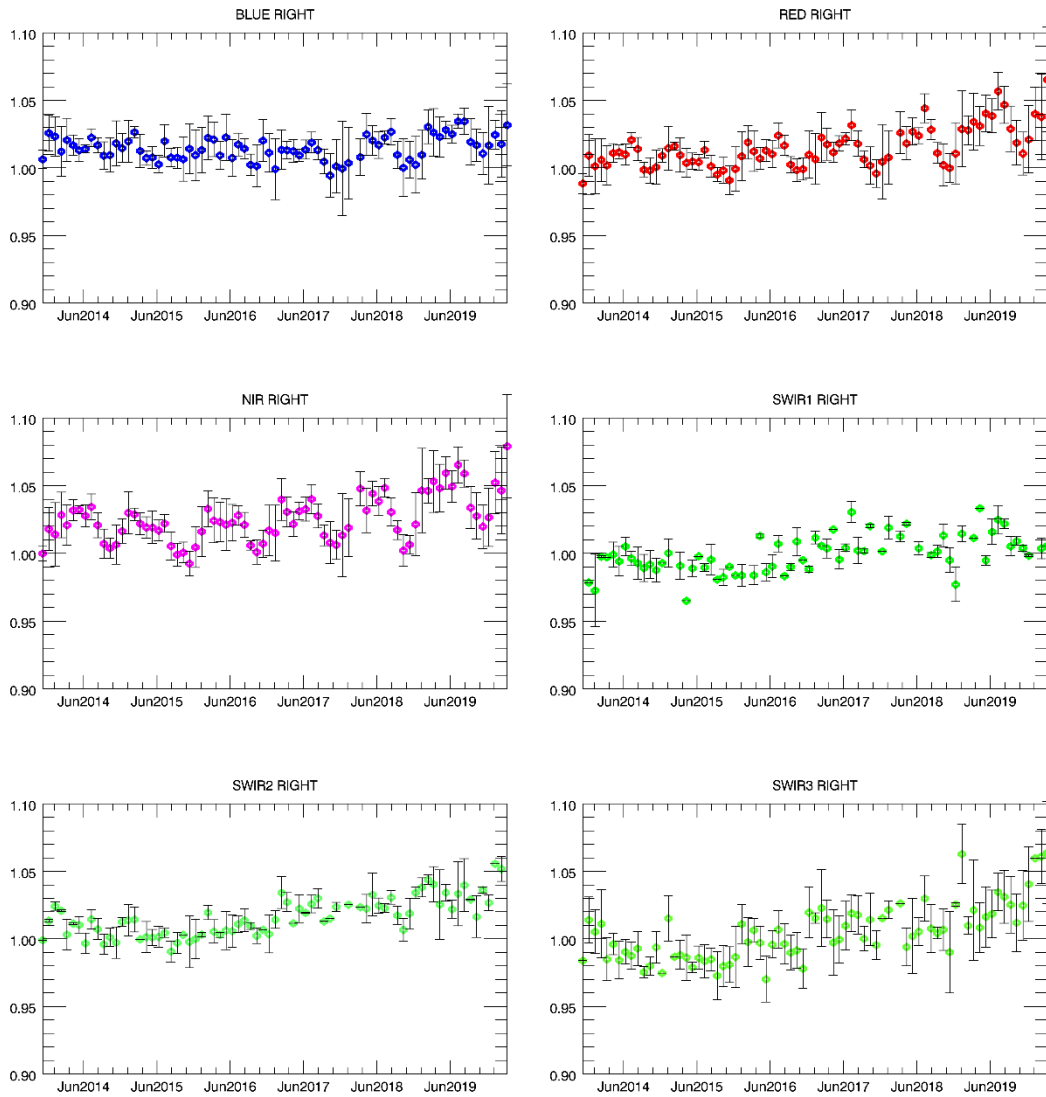


Figure 3. Libya-4 desert calibration results: RIGHT monthly averaged results (collection 1)

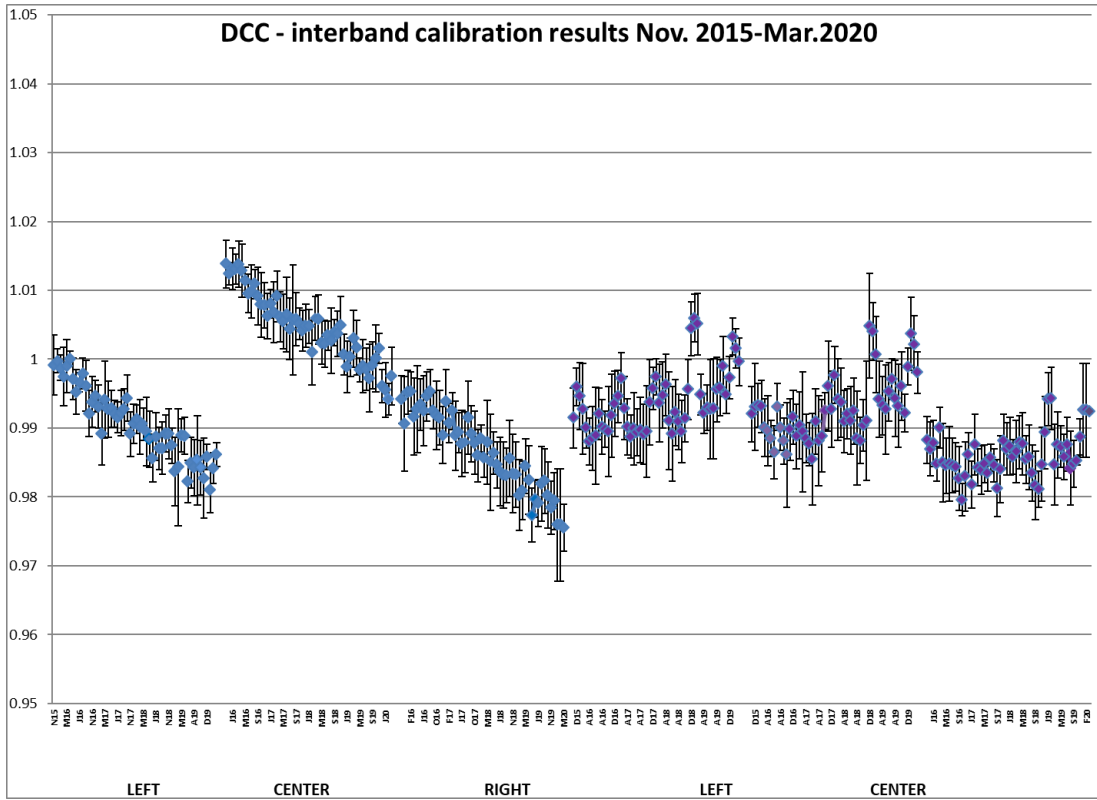


Figure 4. DCC inter-band calibration results: LEFT, CENTER and RIGHT camera (collection 1)

4.2. Geometric Calibration

Calibration image type	Total	Processed	Error
PROBA-V_L1C_INTERSECTION	13141	13141	0

Table13: Processed calibration images for this reporting period

Geometric ICP file

During the reporting period, the average ALE was < 74 m ($\sigma < 93$ m). The daily ALE evolution (see Figure X) shows only limited fluctuations (57 – 84 m for all bands). No major peaks (> 100 m) occurred.

The average compliance was 99.30% (98.85% - 99.71% for BLUE – SWIR).

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

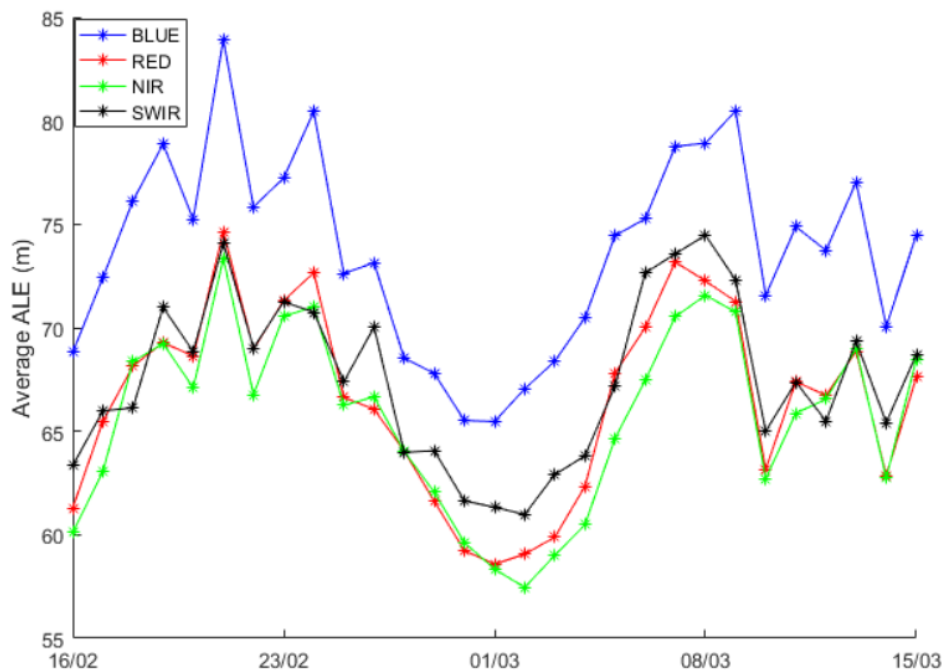


Figure 5 - Daily absolute location error for this reporting period

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-63	Cloud shadow detection at high solar zenith angles not working properly	Open	11/05/2016	Software
PROBAVUS-65	Processing statuses L2 products	In Progress	16/09/2016	Software
PROBAVUS-66	Cloud cover percentages on PDF products are not reliable	Resolved	19/10/2016	Software
PROBAVUS-68	ICP file version not taken into account when processing	In Progress	20/03/2017	Software
PROBAVUS-69	Version number of segment not filtered when querying for syntheses	Open	20/03/2017	Software
PROBAVUS-70	Investigate L2A artefact in data	Open	31/05/2017	Software
PROBAVUS-72	Status mask of data with decompression error is not correctly set	Open	22/06/2017	Software
PROBAVUS-75	Clear pixel edge in cloud shadow detection	Open	15/11/2017	Software

- 0 new issues were logged during this reporting period
- 0 issues were resolved and closed during this reporting period
- 1 issue is resolved but remain to be closed formally
- 1 issue is resolved but remain in the list logging purposes
- 7 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))	0	
Large Gaps (< 21600 km²)	0	
Medium Gaps (< 10000 km²)	3	09/03, 23/02, 18/02
Minor Gaps (< 3600 km²)	4	16/02, 26/02, 24/02, 06/03
Negligible Gaps (< 1000 km²)	22	12/03, 07/03, 02/03, 21/02, 13/03, 17/02, 27/02, 08/03, 22/02, 03/03, 28/02, 04/03, 14/03, 10/03, 15/03, 05/03, 29/02, 19/02, 25/02, 01/03, 11/03, 20/02
Complete synthesis (no gaps)	0	

Table14: Overview of S1 for this reporting period

Synthesis	Missing	Decom. Error	Geom. Error	Missing TFF	Autom. Recovery	VC4 Missing	Create Contours	Other
20200216	8.76%	4	37		1			
20200217	5.30%		25					
20200218	9.14%	5	34					
20200219	2.58%	2	42					
20200220	2.59%	1	39					
20200221	5.86%	2	34					
20200222	4.29%	3	24					
20200223	7.89%	6	32	1	2		1	
20200224	3.25%	4	42		1			
20200225	1.33%	3	29					
20200226	1.52%	1	38		1			
20200227	0.35%		46					
20200228	0.35%	3	38					
20200229	0.77%	1	26			1		
20200301	2.47%		17					
20200302	1.33%	1	15	1				
20200303	0.73%		35					
20200304	0.75%	5	42			1		
20200305	0.76%	2	26					
20200306	8.32%	1	16	1				
20200307	0.46%	3	31					
20200308	0.06%	1	12					
20200309	1.31%	5	21		1			
20200310	0.06%	3	11					
20200311	0.02%		9					
20200312	0.16%	3	22					
20200313	0.08%	1	17					
20200314	0.20%	1	23					
20200315	0.17%	2	14					

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:
No hardware upgrades planned
- Development:
No new developments planned
- No other activities scheduled.

7. Operational remarks

Due to the current CIVID-19 outbreak, Belgium is currently in lockdown, meaning that everyone in non-crucial sectors is obliged to work from home. VITO took the necessary measurements so that the PROBA-V operations are not interrupted and that everything can be followed up from home. Exception on this rule is that we have one system administrator on site to intervene in case of an unplanned downtime. So, service levels can be guaranteed at the time of writing.