MONTHLY OPERATIONS REPORT

MOR#045

Reporting period from 16-Aug-2017 to 15-Sep-2017

Reference: PROBA-V_D5_MOR-045_2017-09_v1.0
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Issuing authority

Change record

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<th>Pages</th>
<th>Description</th>
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1. Summary

During this reporting period, most synthesis products were completed with only negligible or minor gaps. Most of the missing data is due to missing TFF’s (3) and 2 automatic platform recoveries.

Since the first yaw manoeuvre on July 3, 2017, the number of decompression errors remains stable and low. The highest number of decompression errors now occurs when there are problems with the overpasses (lost frames and gaps).

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

The Collection 1 data validation is almost complete and the documentation of this completed validation will be published in the near future.

No new developments are expected in the coming period.

2. System Infrastructure

<table>
<thead>
<tr>
<th>Category</th>
<th>% Up Time</th>
<th>% Down Time</th>
</tr>
</thead>
<tbody>
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<td>Switches</td>
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</tr>
<tr>
<td>Database Servers</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mid Term File Servers</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Short Term File Servers</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Master Servers</td>
<td>95.33</td>
<td>4.67 (*)</td>
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<tr>
<td>Worker Nodes</td>
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<td>0.0</td>
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<tr>
<td>PDF</td>
<td>100.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 1: System Infrastructure availability for this reporting period

(*) Master17 downtime due to technical problems – no effect on product delivery.
3. Image Processing Services

3.1. Ingested and archived products

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Total</th>
<th>Received</th>
<th>Missing data, ingested by VITO</th>
<th>Archived</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO</td>
<td>248</td>
<td>248</td>
<td>0</td>
<td>247</td>
</tr>
<tr>
<td>TFF</td>
<td>311</td>
<td>308</td>
<td>3(*)</td>
<td>308</td>
</tr>
</tbody>
</table>

(* ) 1 missing TFF on 15/08/2017 (TFF 14334 Subject: Antenna problem during pass)
1 missing TFF on 11/09/2017 (TFF 14599 Subject: Antenna did not move during)
1 missing TFF on 14/09/2017 (TFF 14630 Subject: No lock data during pass)

3.2. Generated and archived products

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Total</th>
<th>Processed</th>
<th>Error</th>
<th>Archived</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROBAV_L1A - Calibration</td>
<td>242</td>
<td>242</td>
<td>0</td>
<td>242</td>
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<tr>
<td>PROBAV_L1A - Nominal</td>
<td>2626</td>
<td>2624</td>
<td>2(*)</td>
<td>2626</td>
</tr>
<tr>
<td>PROBAV_L1C</td>
<td>2624</td>
<td>2624</td>
<td>0</td>
<td>2623</td>
</tr>
<tr>
<td>PROBAV_L2A_100M</td>
<td>915</td>
<td>915</td>
<td>0</td>
<td>914</td>
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<tr>
<td>PROBAV_L2A_300M</td>
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<td>2624</td>
<td>0</td>
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<tr>
<td>PROBAV_L2A_1KM</td>
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<td>2624</td>
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<td>2623</td>
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<tr>
<td>PROBAV_L3_S1_TOA_100M</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>PROBAV_L3_S1_TOC_100M</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>PROBAV_L3_S1_TOC_NDVI_100M</td>
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<td>31</td>
<td>0</td>
<td>31</td>
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<tr>
<td>PROBAV_L3_S5_TOA_100M</td>
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<td>6</td>
<td>0</td>
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<tr>
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<td>5</td>
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<td>5</td>
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<tr>
<td>PROBAV_L3_S1_TOA_300M</td>
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<td>31</td>
<td>0</td>
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<tr>
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<td>31</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>PROBAV_L3_S10_TOC_300M</td>
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<td>3</td>
<td>0</td>
<td>3</td>
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<tr>
<td>PROBAV_L3_S10_TOC_NDVI_300M</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>PROBAV_L3_S1_TOA_1KM</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>31</td>
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<tr>
<td>PROBAV_L3_S1_TOC_1KM</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>PROBAV_L3_S10_TOC_1KM</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>PROBAV_L3_S10_TOC_NDVI_1KM</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

(*) 2 x L1A error due geometric processing
3.3. Backup and archiving service

<table>
<thead>
<tr>
<th>Product type</th>
<th>Total Files</th>
<th>Total File Size (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFF</td>
<td>301</td>
<td>692.72</td>
</tr>
<tr>
<td>L1A</td>
<td>2769</td>
<td>1414.53</td>
</tr>
<tr>
<td>Database transaction logs</td>
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<tr>
<td>Database incremental back-up</td>
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<td>47.17</td>
</tr>
<tr>
<td>Database full back-up</td>
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<td>440.54</td>
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Table 4: Back-up data volumes for this reporting period

<table>
<thead>
<tr>
<th>Product type</th>
<th>Total Files</th>
<th>Total File Size (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROBAV_TRANSFERFRAMES</td>
<td>309</td>
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<tr>
<td>PROBAV_L1A</td>
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<td>PROBAV_L1C</td>
<td>2627</td>
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<td>POLARMOTION</td>
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Table 5: Archived data volumes for this reporting period
3.4. Dissemination service

<table>
<thead>
<tr>
<th>Product type</th>
<th>Added to catalogue</th>
<th>Ordered</th>
<th>Delivered</th>
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<tbody>
<tr>
<td>PROBAV_L1C</td>
<td>2624</td>
<td>187</td>
<td>197</td>
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<tr>
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<td>34</td>
<td>39</td>
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<td>155</td>
<td>159</td>
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<td>PROBAV_L3_S1_TOA_100M</td>
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<td>57</td>
<td>56</td>
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<td>PROBAV_L3_S1_TOC_100M</td>
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<td>1614</td>
<td>4103</td>
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<td>320</td>
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<td>153</td>
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<td>33</td>
<td>45</td>
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<td>414</td>
<td>457</td>
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<tr>
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<td>124</td>
<td>137</td>
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<td>PROBAV_L3_S1_TOC_1KM</td>
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<td>189</td>
<td>197</td>
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<td>PROBAV_L3_S10_TOC_1KM</td>
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<td>61</td>
<td>77</td>
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<tr>
<td>PROBAV_L3_S10_TOC_NDVI_1KM</td>
<td>3</td>
<td>1412</td>
<td>1463</td>
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</tbody>
</table>

Table 6: Ordered and delivered products for this reporting period

3.5. End-user activity

17 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 1226 with 111 different nationalities representing 926 different companies/universities.
## Table 7: Data download (GB) in total per Origin of the User for the reporting period

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1C</td>
<td>570.37</td>
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<tr>
<td>PROBAV_L2A_100M</td>
<td>17.48</td>
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<td>PROBAV_L2A_1KM</td>
<td>0.30</td>
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<td>178.63</td>
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<tr>
<td>PROBAV_L3_S5_TOC_100M</td>
<td>777.19</td>
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<tr>
<td>PROBAV_L3_S5_TOC_NDVI_100M</td>
<td>148.53</td>
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<td>PROBAV_L3_S1_TOA_300M</td>
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<td>PROBAV_L3_S1_TOA_1KM</td>
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<td>34.40</td>
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<tr>
<td>PROBAV_L3_S10_TOC_NDVI_1KM</td>
<td>36.84</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Company</th>
<th># Downloads</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSIR-IHBT</td>
<td>4009</td>
</tr>
<tr>
<td>SPACE RESEARCH INSTITUTE RAS (IKI RAN)</td>
<td>3093</td>
</tr>
<tr>
<td>GSI LTD</td>
<td>970</td>
</tr>
<tr>
<td>KOREA NATIONAL PARK SERVICE</td>
<td>701</td>
</tr>
<tr>
<td>VITO</td>
<td>652</td>
</tr>
</tbody>
</table>
Table 9: Top 10 user companies for the reporting period

<table>
<thead>
<tr>
<th>Country</th>
<th># Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEH</td>
<td>479</td>
</tr>
<tr>
<td>SPACE RESEARCH INSTITUTE (IKI)</td>
<td>473</td>
</tr>
<tr>
<td>HUMBOLDT-UNIVERSITÄT ZU BERLIN</td>
<td>377</td>
</tr>
<tr>
<td>ARMSTATEHYDROMET</td>
<td>339</td>
</tr>
<tr>
<td>NAGOYA UNIVERSITY</td>
<td>268</td>
</tr>
</tbody>
</table>

Table 10: Top 10 countries with most registered users

<table>
<thead>
<tr>
<th>Country</th>
<th># Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHINA</td>
<td>116</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>99</td>
</tr>
<tr>
<td>ITALY</td>
<td>62</td>
</tr>
<tr>
<td>FRANCE</td>
<td>60</td>
</tr>
<tr>
<td>UNITED STATES</td>
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<td>BRAZIL</td>
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<tr>
<td>GERMANY</td>
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<tr>
<td>NETHERLANDS</td>
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</tr>
</tbody>
</table>

List of issues raised by users:

ProbaV:
- Large geometric shift (20160218-20160219)
4. Image Calibration services

4.1. Radiometric Calibration

<table>
<thead>
<tr>
<th>Calibration request type</th>
<th>Total</th>
<th>Processed</th>
<th>Not received</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOUDS</td>
<td>15</td>
<td>13</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>DARK CURRENT</td>
<td>23</td>
<td>21</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>MOON</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
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<td>RAYLEIGH</td>
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</table>

*Table 11: Calibration Image requests for this reporting period*

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<tr>
<th>Calibration image type</th>
<th>Total</th>
<th>Valid</th>
<th>Invalid</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROBA_V_L1A_CALIBRATION</td>
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</tr>
<tr>
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<td>240</td>
<td>218</td>
<td>22</td>
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<td>PROBA-V_L1B_INTERSECTION</td>
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<td>364</td>
<td>416</td>
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<tr>
<td>PROBA-V_L1B_OVERLAPREGION</td>
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</table>

*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 and Figure 2 and Figure 3. Deep convective clouds interband calibration results are given in Figure 4.

Since September 2017 the degradation model for LEFT and CENTER BLUE bands have been adapted as the previous coefficient seemed to slightly underestimate the observed trend and therefore also needs to be adapted. The coefficients of the degradation model for RIGHT SWIR strips have also been adapted as the previous model overcorrected the observed trend.

The analyses of the data of the yaw manoeuvres performed on 3rd and 12th of July for CENTER and RIGHT cameras is on-going. Preliminary results show that the yaw maneuver data allow to consistently retrieve the low frequency equalization profiles. Before updating the equalization coefficients in the ICP files, the retrieved profiles will be verified on nominal images.

No new bad pixels have been found.
The status of the PROBA-V radiometric calibration has been presented at the Workshop on Radiometric Calibration for European Optical Missions" which was held in ESRIN from 30th through 31st of August.

Radiometric ICP file

Both the SWIR and BLUE LEFT/CENTER absolute calibration coefficients will be updated following a linear degradation model. Furthermore the dark currents will be updated.

The current ICP files are

- PROBAV_ICP_RADIOMETRIC#LEFT_20170901_V01
- PROBAV_ICP_RADIOMETRIC#CENTER_20170901_V01
- PROBAV_ICP_RADIOMETRIC#RIGHT_20170901_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)
4.2. Geometric Calibration

Table 13: Processed calibration images for this reporting period

<table>
<thead>
<tr>
<th>Calibration image type</th>
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<th>Processed</th>
<th>Error</th>
</tr>
</thead>
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<td>14231</td>
<td>14231</td>
<td>0</td>
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</tbody>
</table>

During the previous month, the average ALE was $< 77$ m (σ $< 90$ m). Daily values started off at 80 – 90 m and gradually decreased to a minimum of 55 – 67 m at 26/8. This minimum was followed by a steep increase to maxima of 85 – 96 m and 87 – 105 m at 1/9 and 5/9, respectively. After the latter maximum, values sharply declined to $< 75$ m during the remaining period. The daily ALE evolution is shown in Figure 5.

The geometric accuracy was within the requirement of $< 300$ m, with an average compliance of 99.2% (98.80 – 99.76% from BLUE to SWIR). The usual compliance minima synchronous with the ALE maxima occurred, with the lowest values occurring at 5/9 (98.2 – 99.7 from BLUE to SWIR).
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 16/8/2017 – 15/9/2017.
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

<table>
<thead>
<tr>
<th>Key</th>
<th>Summary</th>
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<th>Created</th>
<th>Component/s</th>
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<td>Very small images fail to process</td>
<td>Resolved</td>
<td>10/01/2014</td>
<td>General</td>
</tr>
<tr>
<td>PROBAVUS-63</td>
<td>Cloud shadow detection at high solar zenith angles not working properly</td>
<td>Open</td>
<td>11/05/2016</td>
<td>Software</td>
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<tr>
<td>PROBAVUS-65</td>
<td>Processing statuses L2 products</td>
<td>In Progress</td>
<td>16/09/2016</td>
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<td>PROBAVUS-66</td>
<td>Cloud cover percentages on PDF products are not reliable</td>
<td>Resolved</td>
<td>19/10/2016</td>
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<td>20/03/2017</td>
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<td>PROBAVUS-69</td>
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<tr>
<td>PROBAVUS-70</td>
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<td>31/05/2017</td>
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<td>PROBAVUS-72</td>
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<td>PROBAVUS-73</td>
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<td>30/08/2017</td>
<td>Geometry</td>
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</table>

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

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<td><strong>Major Gaps (&gt; 21600 km² (missing TFF))</strong></td>
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<td><strong>Large Gaps (&lt; 21600 km²)</strong></td>
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<tr>
<td><strong>Medium Gaps (&lt; 10000 km²)</strong></td>
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<td>18/08, 25/08, 14/09</td>
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<tr>
<td><strong>Complete synthesis (no gaps)</strong></td>
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<td>03/09, 26/08, 12/09</td>
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*Table 14: Overview of S1 for this reporting period*
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</tr>
</tbody>
</table>

*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:
  An improvement of the cloud detection algorithm is under investigation.

- No other activities scheduled.

7. Operational remarks

Since the first yaw manoeuvre on July 3, 2017 the number of decompression errors remains stable and low. The highest number of decompression errors now occurs when there are problems with the overpasses (lost frames and gaps).