S3-A SLSTR Cyclic Performance Report

Cycle No. 011

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1 Instrument monitoring

1.1 Instrument temperatures

- Instrument temperatures have been stable and consistent with previous operations (see Figure 1).
- Blackbody, baffle and OME temperatures all show a systematic increase in temperature during the last two cycles. This is due to the fact that the Earth is getting closer to the Sun until perihelion on January 3rd and the instrument is slowly heating up. This will be monitored carefully over the coming weeks.

![Detector Temps VIS Channels](image1)
![Detector Temps SWIR and TIR Channels](image2)

*Figure 1: Detector temperatures for each channel from 1st March 2016. Discontinuities occur for the infrared channels where the FPA was heated for decontamination or following an anomaly. The vertical dashed lines indicate the start and end of each cycle.*
Figure 2: Blackbody temperature and baseplate gradient trends. The vertical dashed lines indicate the start and end of each cycle.
Figure 3: Baffle temperature trends. The vertical dashed lines indicate the start and end of each cycle.
Figure 4: OME temperature trends showing the paraboloid stops and flip baffle (top two plots) and optical bench and scanner and flip assembly (lower two plots). The top two plots only show data starting from 30th July 2016. The vertical dashed lines indicate the start and end of each cycle.
1.2 Scanner performance

- Scanner performance has been consistent with previous operations and within required limits. There was a small systematic increase in Nadir Scanner min-max jitter during the cycle for both Earth views, but the peak-to-peak level did not increase beyond values that have been seen before, or go out of limits, and has returned to its previous level by the end of the cycle.

![Nadir Scanner Jitter Trend](image)

![Oblique Scanner Jitter Trend](image)

![Flip Mirror Jitter Trend](image)

*Figure 5: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the nadir view. The vertical dashed lines indicate the start and end of each cycle.*
Figure 6: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the oblique view. The vertical dashed lines indicate the start and end of each cycle.

1.3 Detector noise levels

1.3.1 VIS and SWIR channel signal-to-noise

The VIS and SWIR channel signal-to-noise is stable and consistent with previous operations.
Figure 7: VIS and SWIR channel signal-to-noise. Different colours indicate different detectors.
1.3.2 TIR channel NEDT

The thermal channel NEDT values are consistent with previous operations and within the requirements.

Figure 8: NEDT trend for the thermal channels. Blue points were calculated from the cold blackbody signal and red points from the hot blackbody. Horizontal lines indicate the requirement (dashed) and goal (dotted) as well as the measured values on ground (red and blue dashed).
1.4 Calibration factors

1.4.1 VIS and SWIR VISCAL signal response

Signals from the VISCAL source for the VIS channels show oscillations due to the build up of ice on the optical path within the FPA. Decontamination is carried out periodically, in order to warm up the FPA and remove the ice. The last decontamination cycle was successfully performed at the beginning of October in the middle of cycle 009.

Yaw manoeuvres were carried out as described in Section 2, and these affected the VISCAL signal, which shows a slightly lower value than the surrounding orbits for both VIS and SWIR channels (indicated by the red arrows in Figure 9 and Figure 10 on 17th, 22nd and 29th November). This is due to the changed solar azimuth angle on the diffuser. See Section 2 for more details.

![Figure 9: VISCAL signal trend for VIS channels (nadir view).](image-url)
Figure 10: VISCAL signal trend for SWIR channels (nadir view).
2 Events

SLSTR has been switched on and operating nominally during the cycle, with SUE scanning and autonomous switching between day and night modes, apart from the following tests:

- OLCI/SLSTR diffuser characterisation tests were performed on 17\textsuperscript{th} November, 22\textsuperscript{nd} November, 29\textsuperscript{th} November, and 7\textsuperscript{th} December. These involved satellite yaw manoeuvres during the period that the Sun was illuminating the VISCAL diffuser in order to change the Solar azimuth angle in the diffuser frame (with a duration of 18.5 minutes). The first three tests affect a single orbit. Analysis of the SLSTR data shows that the instrument responded as expected to the tests. Any variation in the VISCAL measured signal in these tests occurs on top of the background signal oscillations caused by the formation of ice in the SLSTR optical path (see Section 1.4.1).

The fourth test affects 8 consecutive orbits between 06:10 and 18:30 on 7th December. Figure 11 shows the VISCAL signal in each orbit from the 5th to the 7th of December. The background trend is due to the ice in the optical path (see Section 1.4.1) and the small changes in signal during the yaw manoeuvres on the 7th are due to the different Solar azimuth angles used in the 8 orbits of the test.

NOTE: Users should be aware that the SLSTR image quality during the manoeuvre period will be affected.

![Figure 11: VISCAL signal measured from the 5th to the 7th of December. The squares represent the results determined by the IPF processor (signal minus dark from the VISCAL ADF files), and the circles show the calculated values from raw data.](image-url)
An SLSTR seasonal stray light test was performed over three orbits on 25th November between approximately 09:05 and 14:05. This test involves measuring detector signals around the full scan cycle rather than only across the swath of the Earth views and over the calibration targets. The aim of the test is to detect any stray light outside of the normal Earth and calibration target views. The data were compared with previous stray light tests performed at different times of year, and were found to be consistent with no unexpected results.

NOTE: Users should be aware that these orbits do not contain standard SLSTR data.
3 Appendix A

Other reports related to the Optical mission are:

- S3-A OLCI Cyclic Performance Report, Cycle No. 011 (ref. S3MPC.ACR.PR.01-011)

All Cyclic Performance Reports are available on MPC pages in Sentinel Online website, at: https://sentinel.esa.int

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