PREPARATION AND OPERATIONS OF THE MISSION PERFORMANCE CENTRE (MPC) FOR THE COPERNICUS SENTINEL-3 MISSION

S3-A SLSTR Cyclic Performance Report

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Author(s):	SLSTR ESLs		
Approved by:	D. Smith, SLSTR ESL Coordinator	**Authorized by**	Frédéric Rouffi, OPT Technical Performance Manager
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Accepted by ESA	S. Dransfeld, MPC Deputy TO for OPT P. Féménias, MPC TO		
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Changes Log

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1.0	29/03/2017	First Version

List of Changes

Version	Section	Answers to RID	Changes

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1 Instrument monitoring

1.1 Instrument temperatures

- Instrument temperatures were stable and consistent with previous operations until an anomaly at 00:01 on 16th March (see Section 2 for more details). Following the anomaly, a switch-off and cooldown procedure was used to recover the instrument, with nominal operations resumed at 22:26 on 17th March. A full decontamination phase, such as was performed after the 14th February anomaly, was not required.
- After the cooldown, the infra-red detector temperatures have returned to the value that they had before the anomaly.
- Blackbody, baffle and OME temperatures all showed a systematic increase in temperature during previous cycles due to the fact that the Earth was getting closer to the Sun until perihelion on January 3rd and causing the instrument to slowly heat up. The trend is now reversed and temperatures are decreasing slightly as we move away from the Sun.
- The blackbody and instrument temperatures were affected during the recovery from the anomaly, but have returned to their normal values following the cooldown of the detectors.

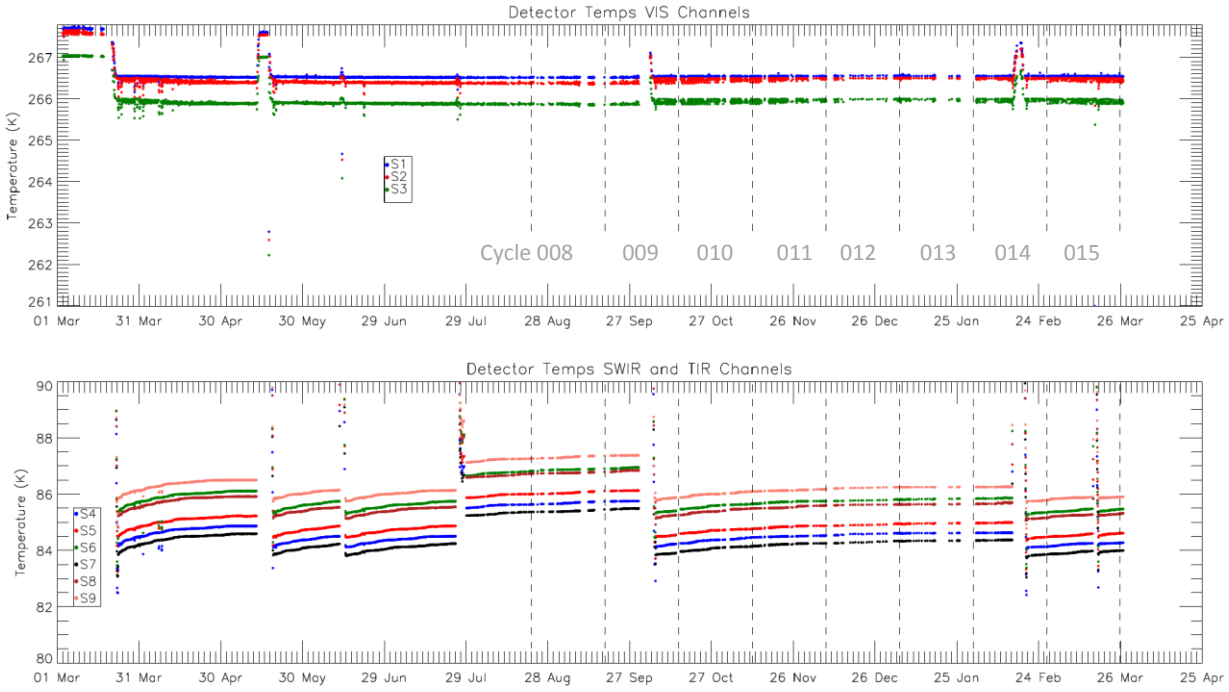

Figure 1: Detector temperatures for each channel from 1st March 2016. Discontinuities occur for the infrared channels where the FPA was heated for decontamination or following an anomaly. The vertical dashed lines indicate the start and end of each cycle.

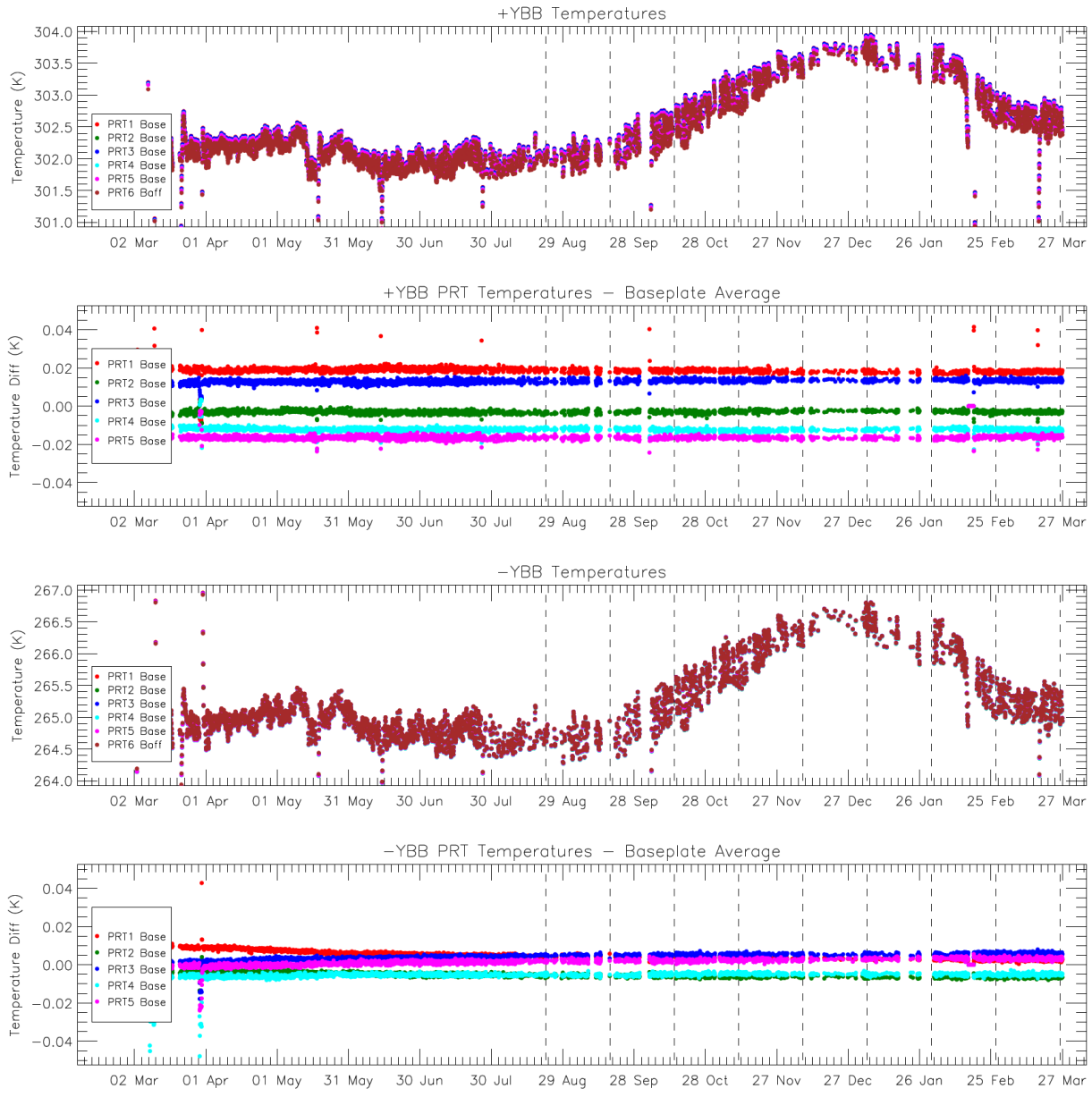

Figure 2: Blackbody temperature and baseplate gradient trends. The vertical dashed lines indicate the start and end of each cycle.

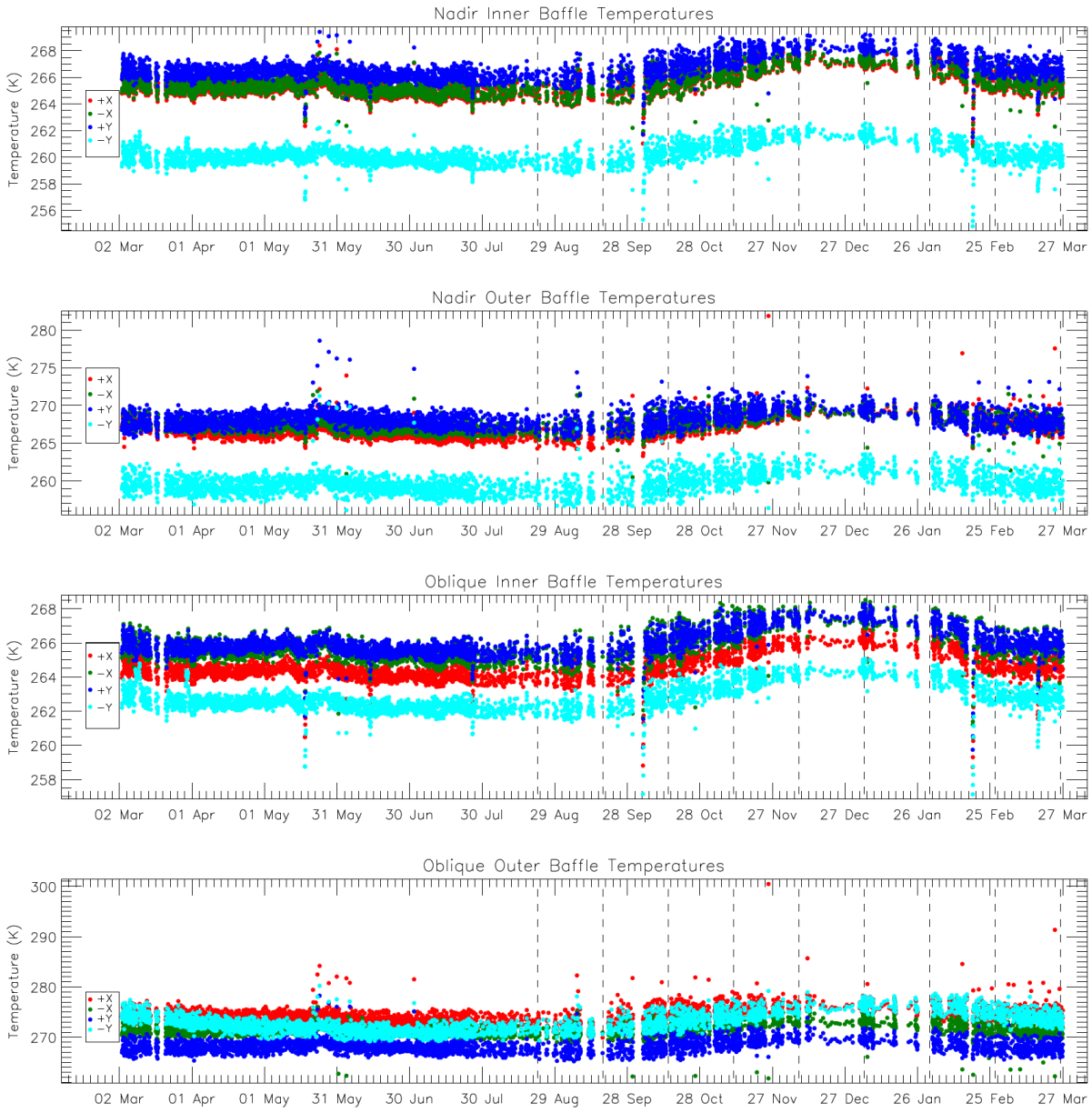

Figure 3: Baffle temperature trends. The vertical dashed lines indicate the start and end of each cycle.

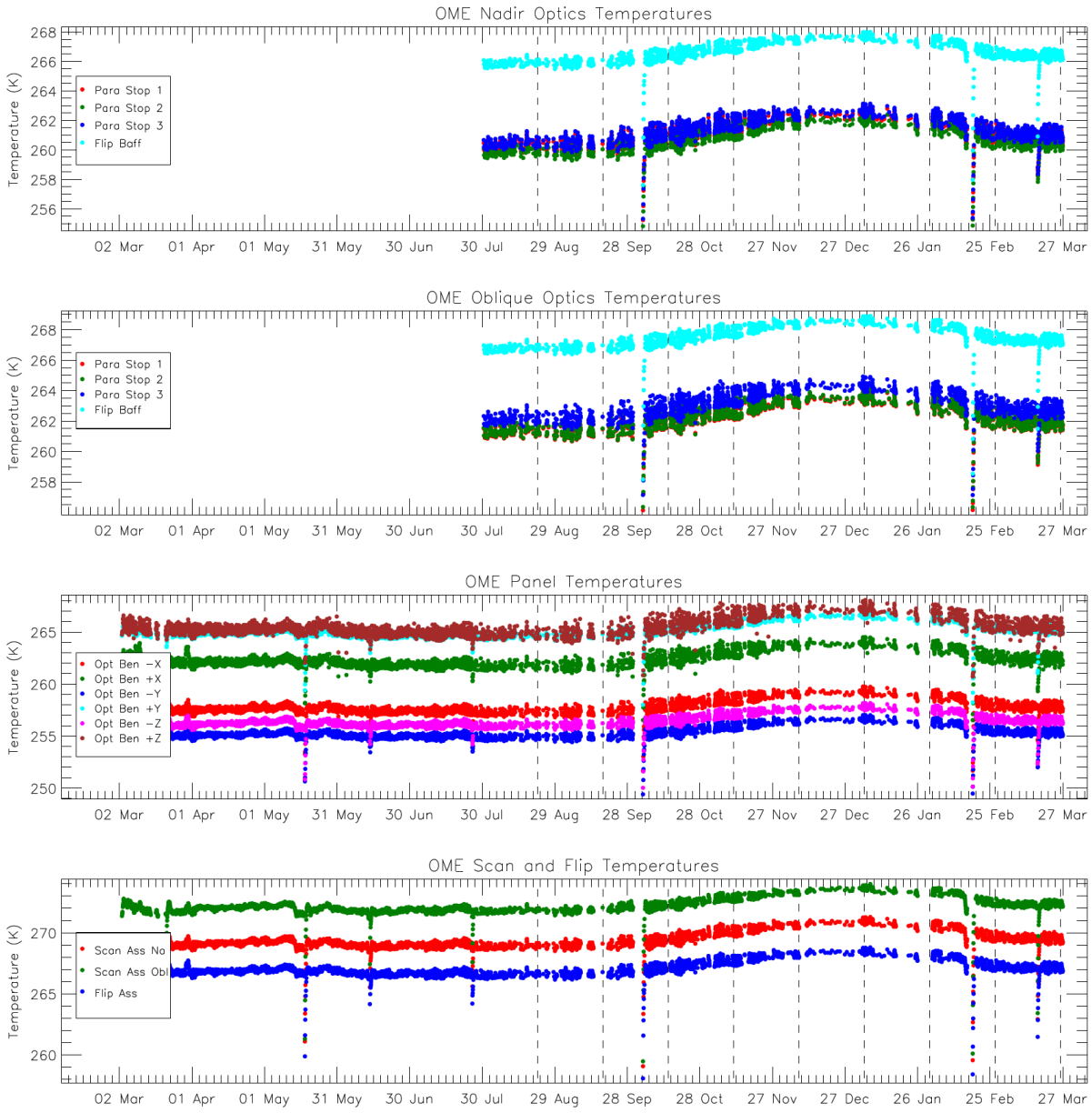

Figure 4: OME temperature trends showing the paraboloid stops and flip baffle (top two plots) and optical bench and scanner and flip assembly (lower two plots). The top two plots only show data starting from 30th July 2016. The vertical dashed lines indicate the start and end of each cycle.

1.2 Scanner performance

- Scanner performance has been consistent with previous operations and within required limits.

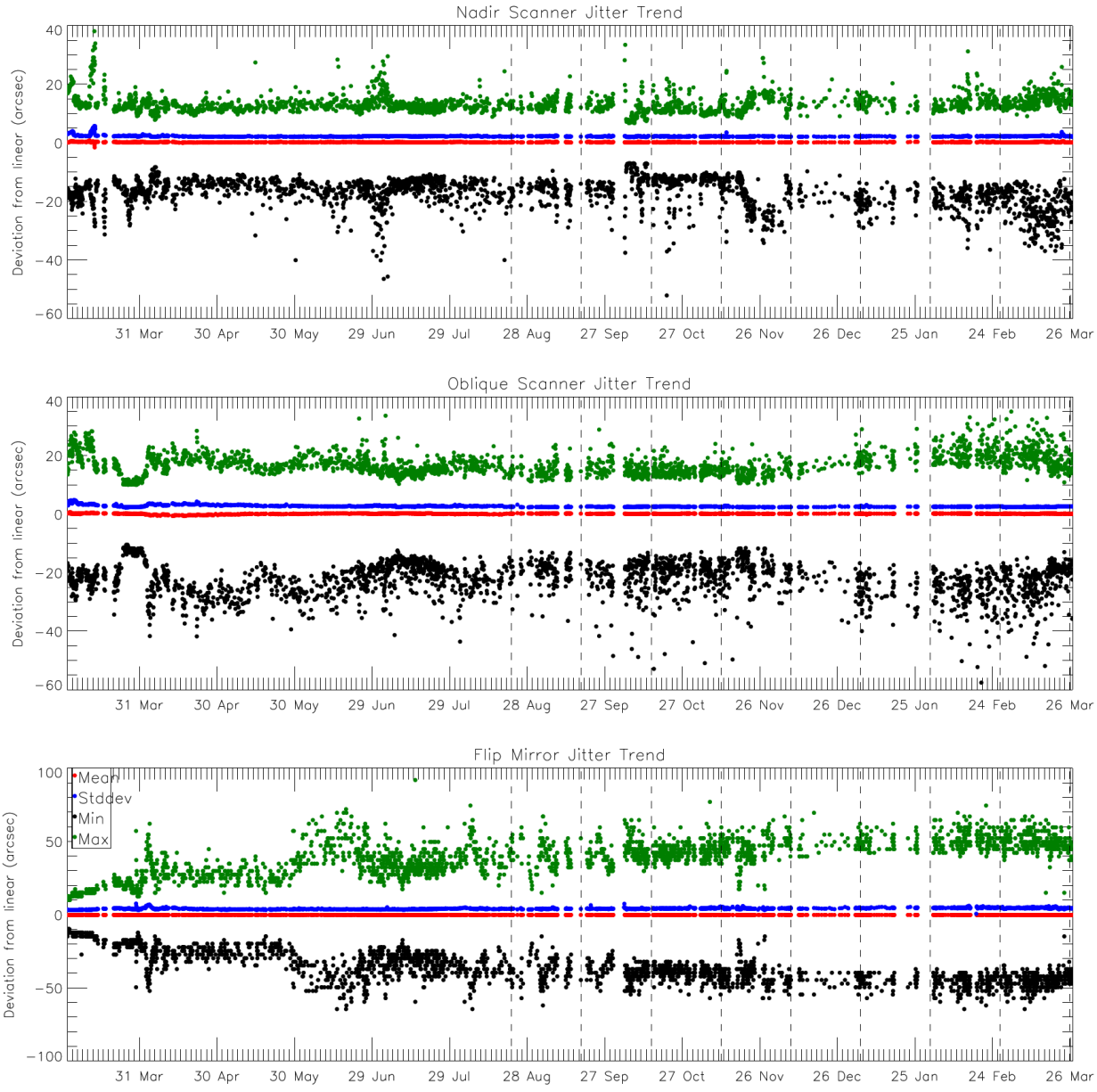

Figure 5: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the nadir view. The vertical dashed lines indicate the start and end of each cycle.

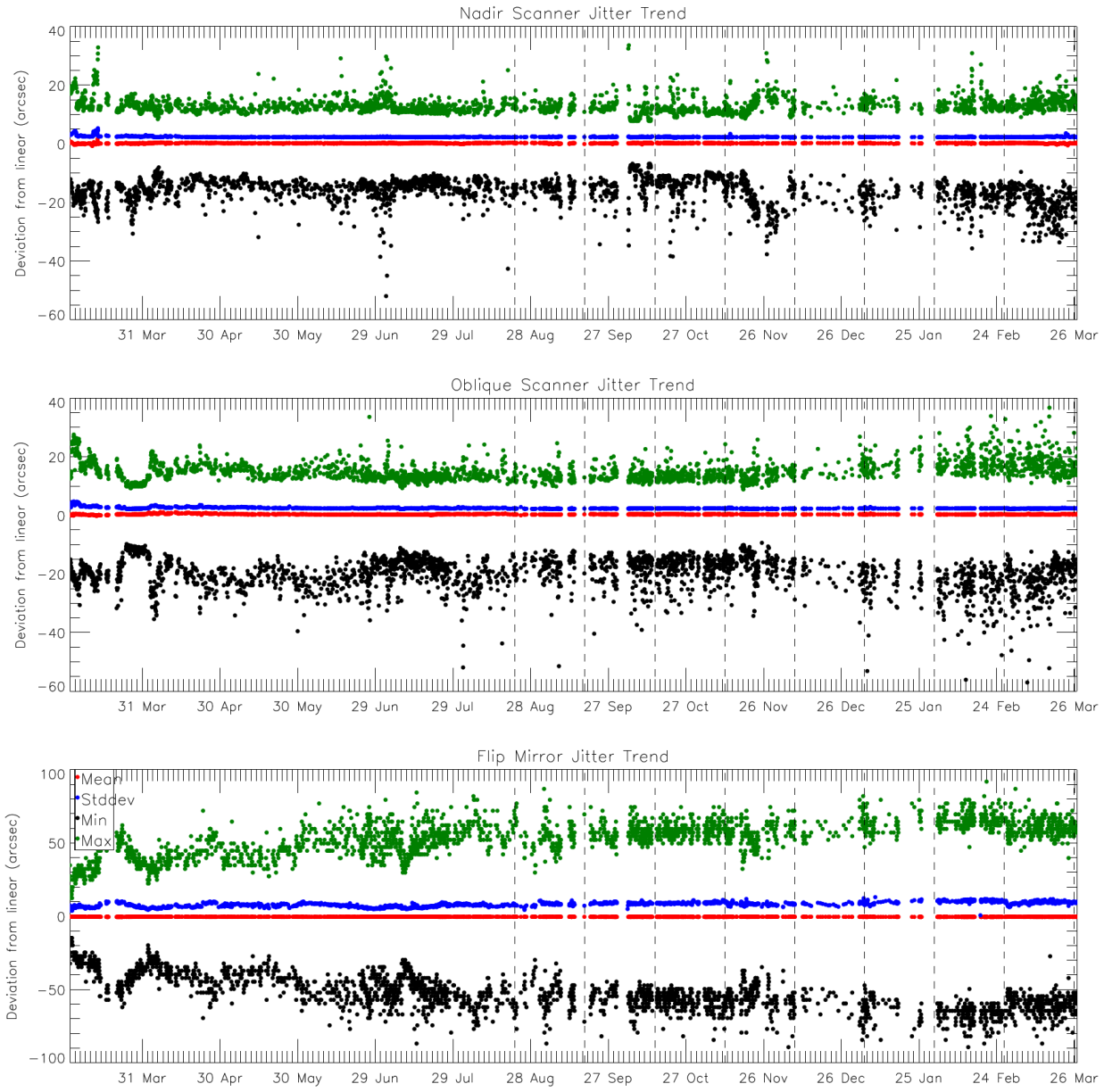

Figure 6: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the oblique view. The vertical dashed lines indicate the start and end of each cycle.

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. Noise levels haven't changed significantly following the anomaly.

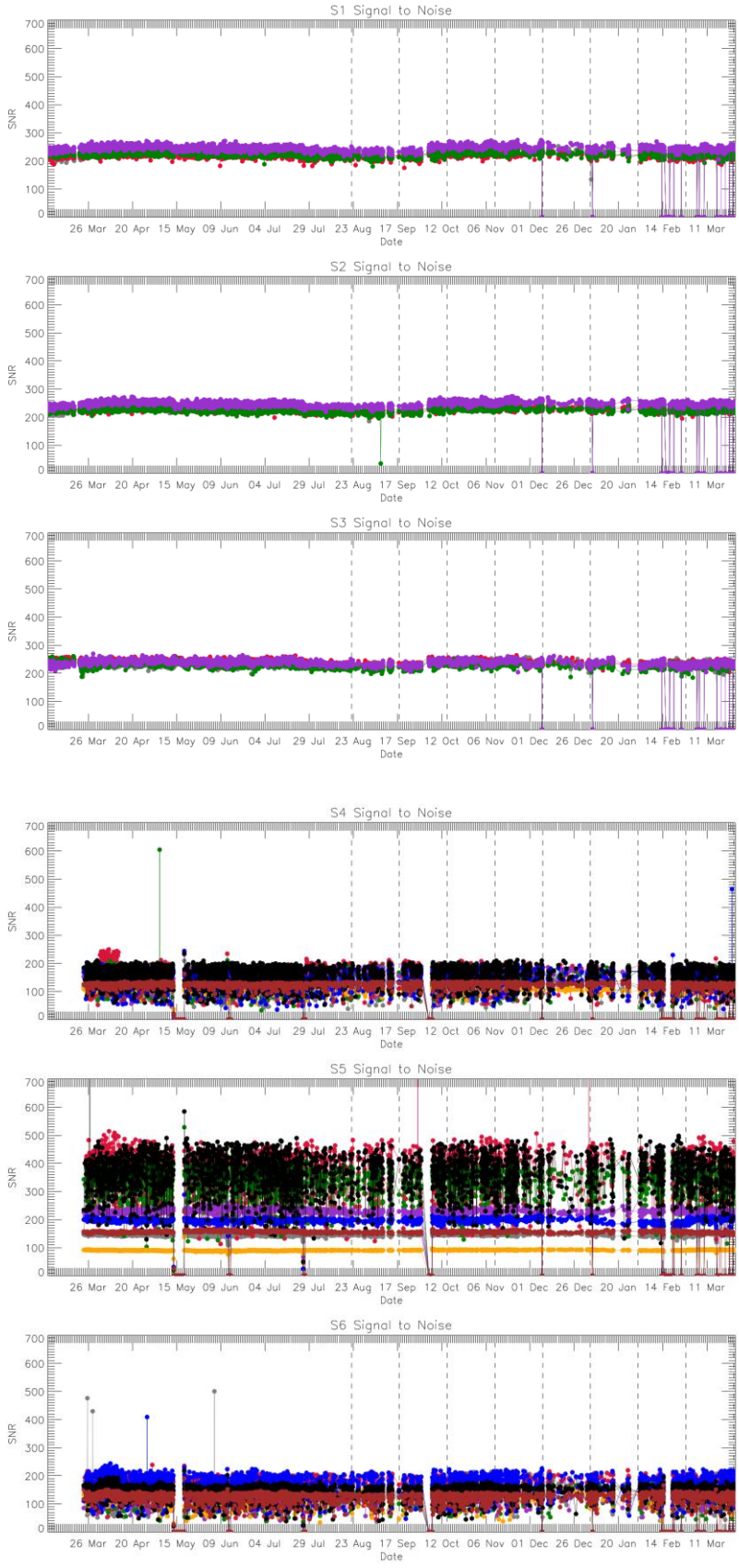

Figure 7: VIS and SWIR channel signal-to-noise. Different colours indicate different detectors.

1.3.2 TIR channel NEDT

The thermal channel NEDT values are consistent with previous operations and within the requirements. Noise levels haven't changed significantly following the anomaly.

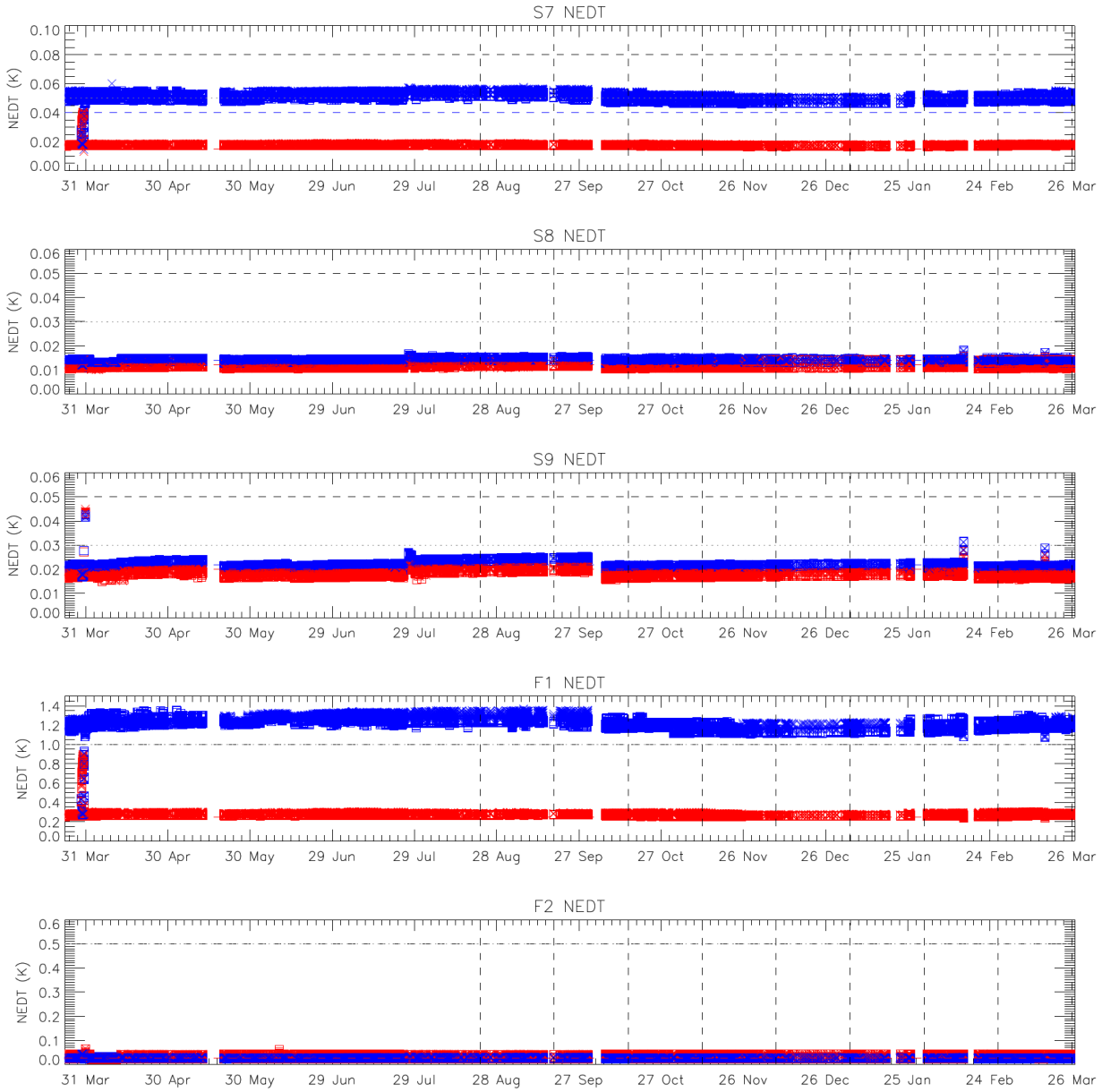

Figure 8: NEDT trend for the thermal channels. Blue points were calculated from the cold blackbody signal and red points from the hot blackbody. Horizontal lines indicate the requirement (dashed) and goal (dotted) as well as the measured values on ground (red and blue dashed).

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 following the anomaly on 14th February. Following the anomaly on 16th March and the subsequent cooldown, the VISCAL signals have returned to their pre-anomaly levels and the oscillations in signal have continued from where they left off.

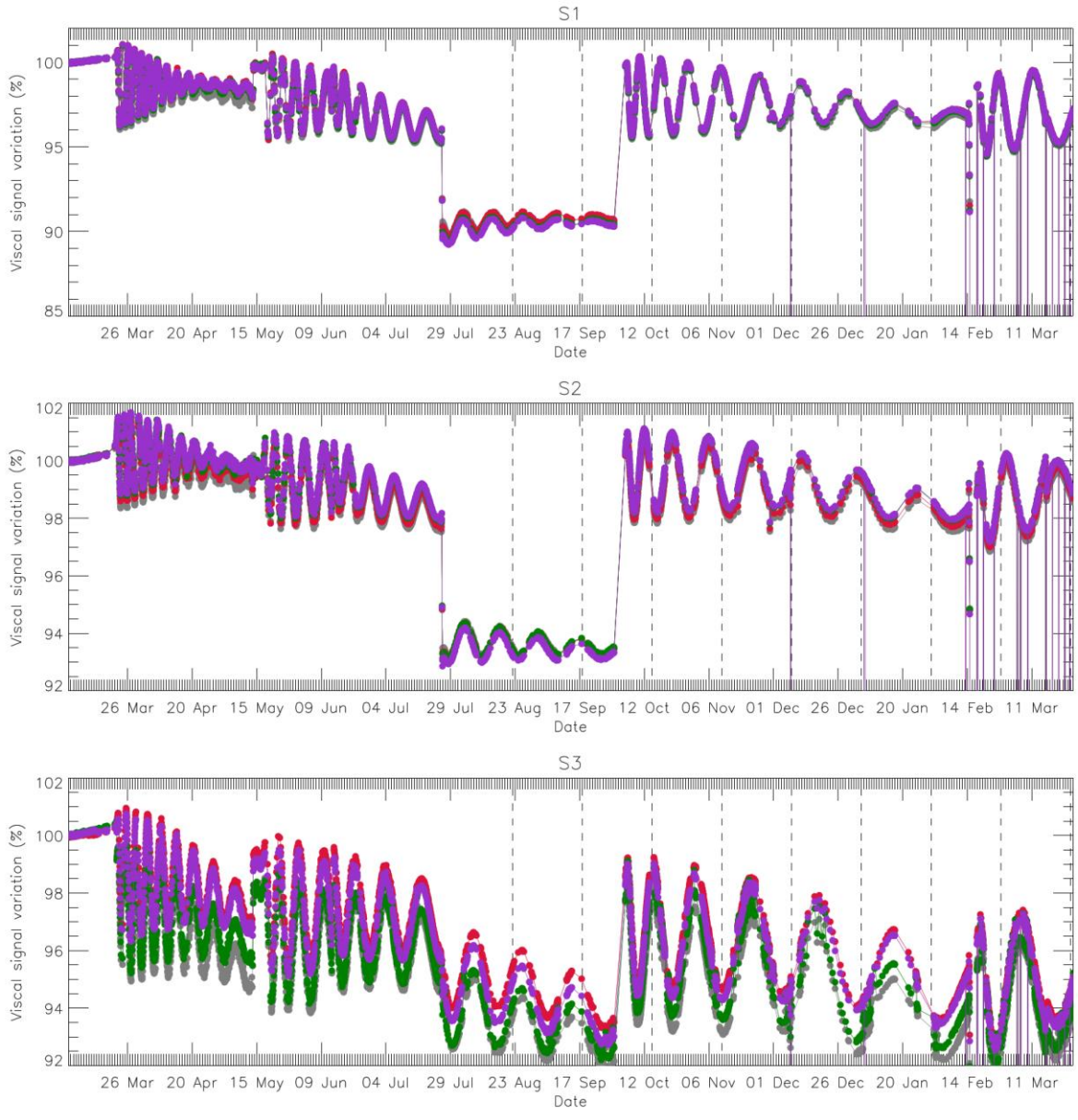

Figure 9: VISCAL signal trend for VIS channels (nadir view).

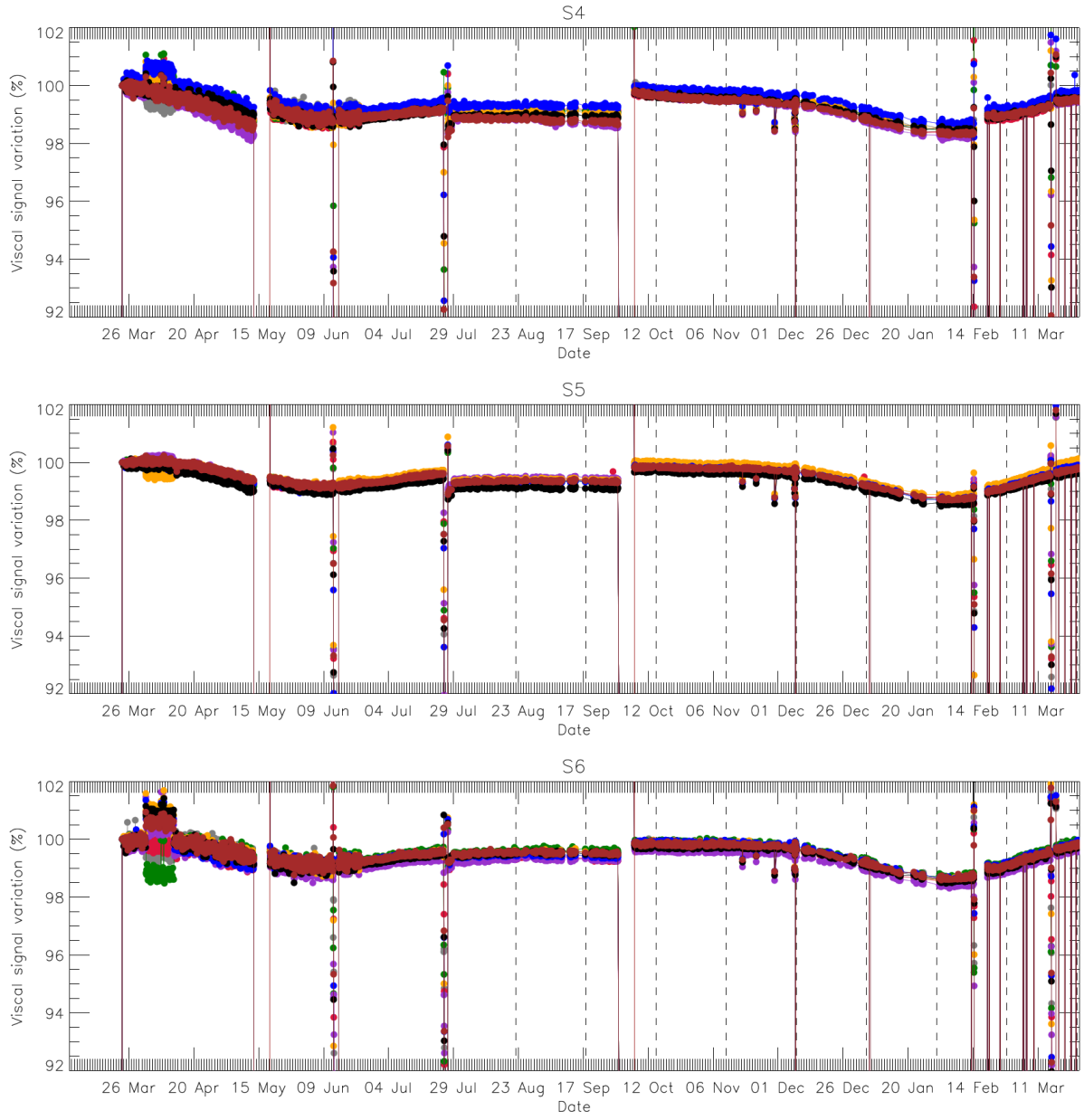

Figure 10: VISCAL signal trend for SWIR channels (nadir view).

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:

- A Floating Point Unit (FPU) trap anomaly occurred on the 16th March 2017 at 00:01:55. This type of event last happened on 14th February 2017. Following the February anomaly the instrument was set into CDE Standby-Refuse mode, and recovery carried out by running a full decontamination cycle. However, this time, a full decontamination cycle was not required and a faster switch off and cool down procedure was used.
- The instrument was switched off at 09:32 on 16th March (after orbit 249) and switched to standby mode in the pass at 12:44. Cooling was started at 14:30. Level-0 data were available again starting from orbit 253 (14:34). Scanning was started at 16:00 and the visible channels were switched on and available again from 16:07 on 16th March. The thermal channels reached temperature and the instrument was switched to ON DUTY mode at 22:26 on 17th March.
- Note that the calibration and signal to noise were degraded during the period when the instrument warmed up due to the anomaly. Data obtained between 00:01 on 16th March and 22:26 on 17th March should not be used.

3 Appendix A

Other reports related to the Optical mission are:

- S3-A OLCI Cyclic Performance Report, Cycle No. 015 (ref. S3MPC.ACR.PR.01-015)

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

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