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

S3-A SLSTR Cyclic Performance Report

Cycle No. 017

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SENTINEL 3

Mission Performance Centre

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Changes Log

Version	Date	Changes
1.0	26/05/2017	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. The apparent drop in visible channel temperatures for 2 orbits in cycle 17 is due to the start and end of the dynamic range test performed on 2nd May (see Section 2).
- Blackbody, baffle and OME temperatures peaked around 3rd January when the Earth was at perihelion.

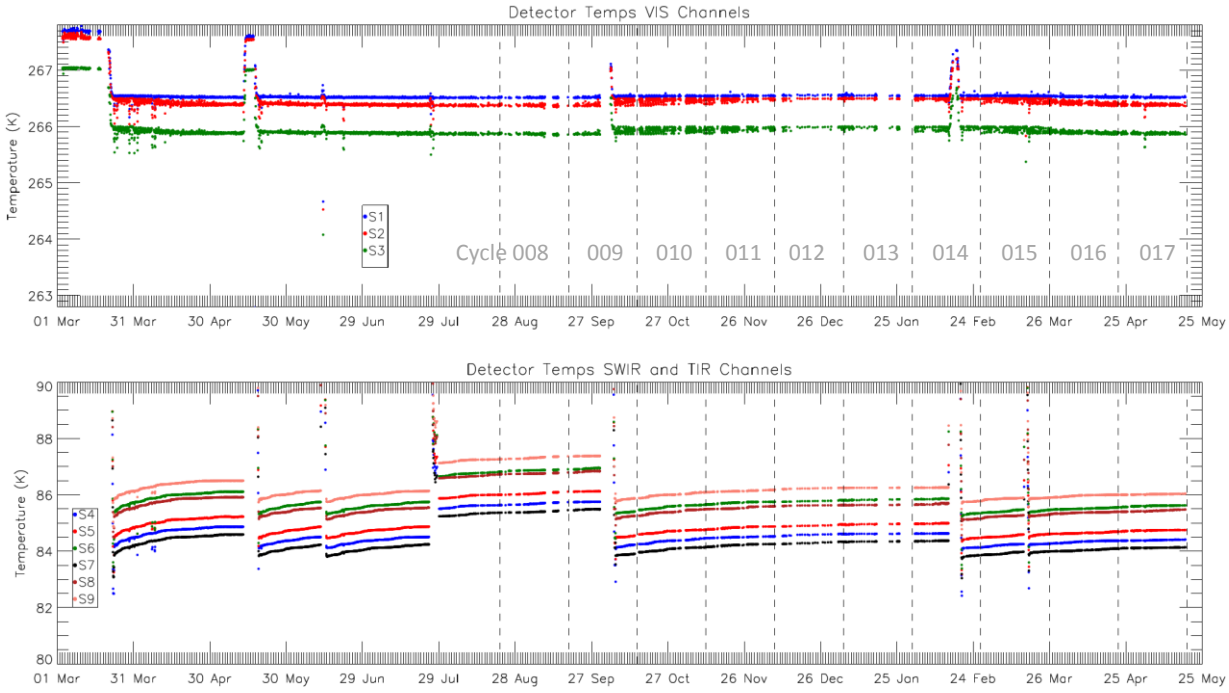

Figure 1: Detector temperatures for each channel from 1st March 2016. Discontinuities occur for the infrared channels where the FPA was heated for decontamination or following an anomaly. The vertical dashed lines indicate the start and end of each cycle.

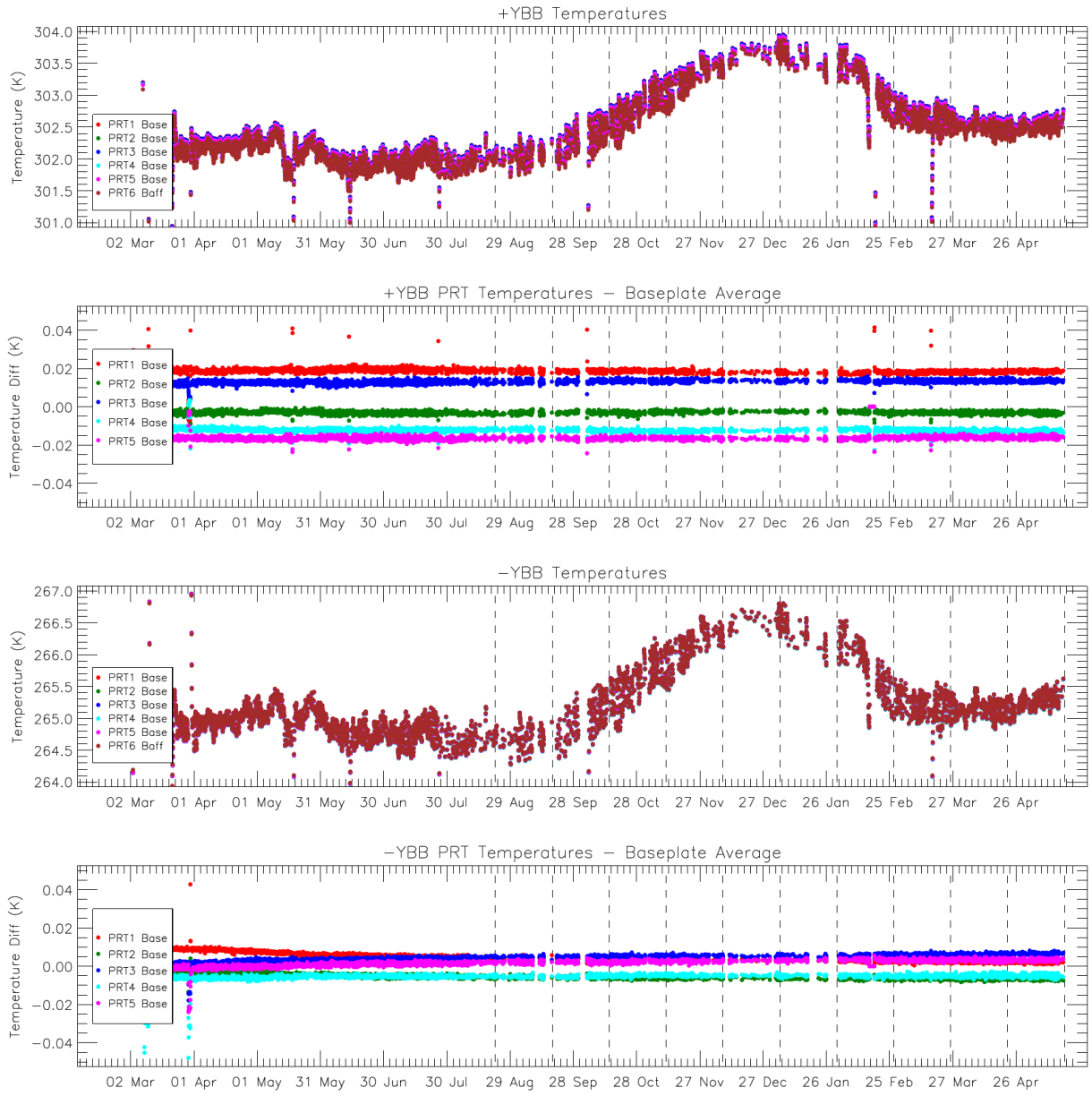

Figure 2: Blackbody temperature and baseplate gradient trends. The vertical dashed lines indicate the start and end of each cycle.

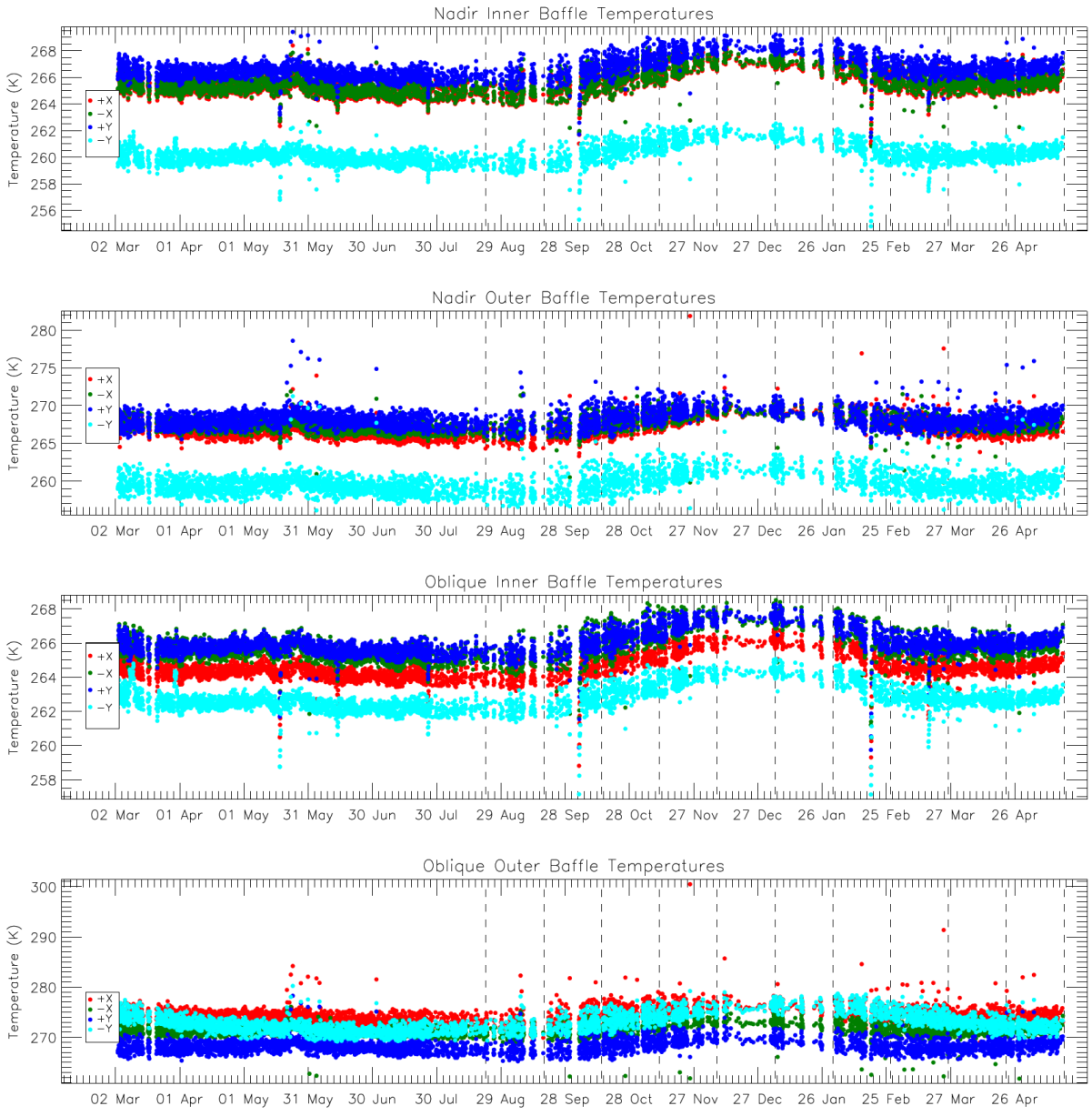

Figure 3: Baffle temperature trends. The vertical dashed lines indicate the start and end of each cycle.

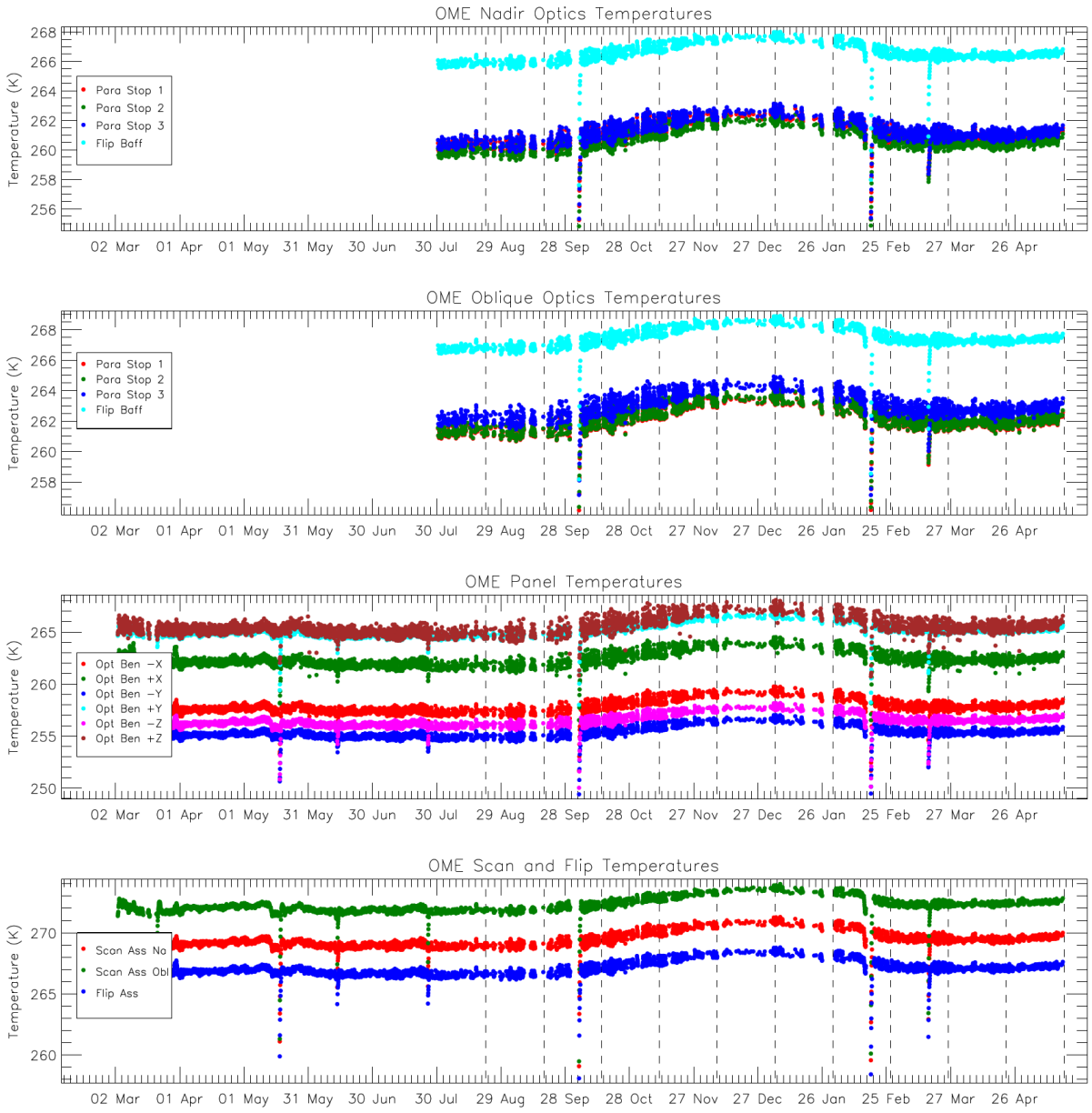

Figure 4: OME temperature trends showing the paraboloid stops and flip baffle (top two plots) and optical bench and scanner and flip assembly (lower two plots). The top two plots only show data starting from 30th July 2016. The vertical dashed lines indicate the start and end of each cycle.

1.2 Scanner performance

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

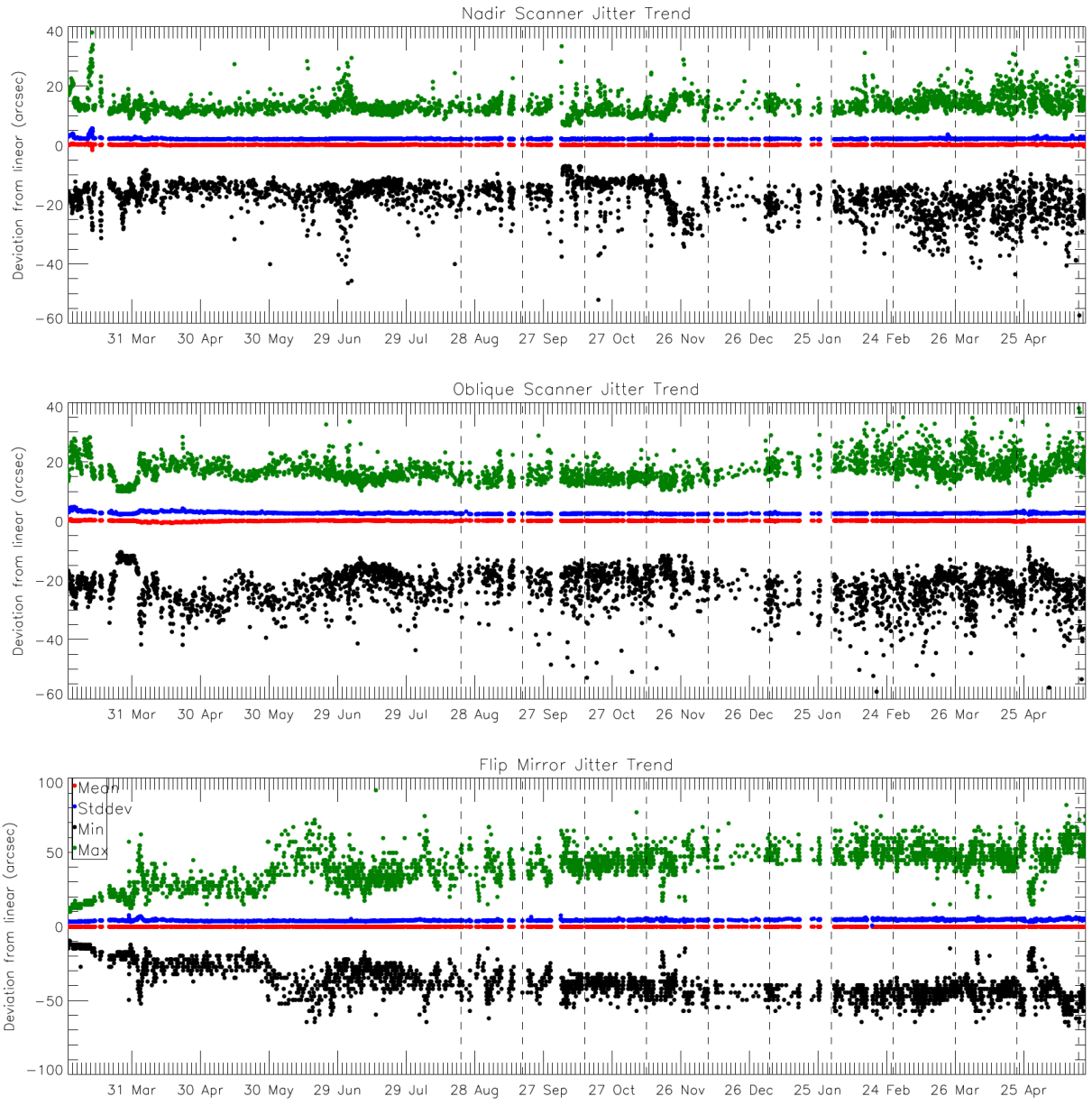

Figure 5: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the nadir view. The vertical dashed lines indicate the start and end of each cycle.

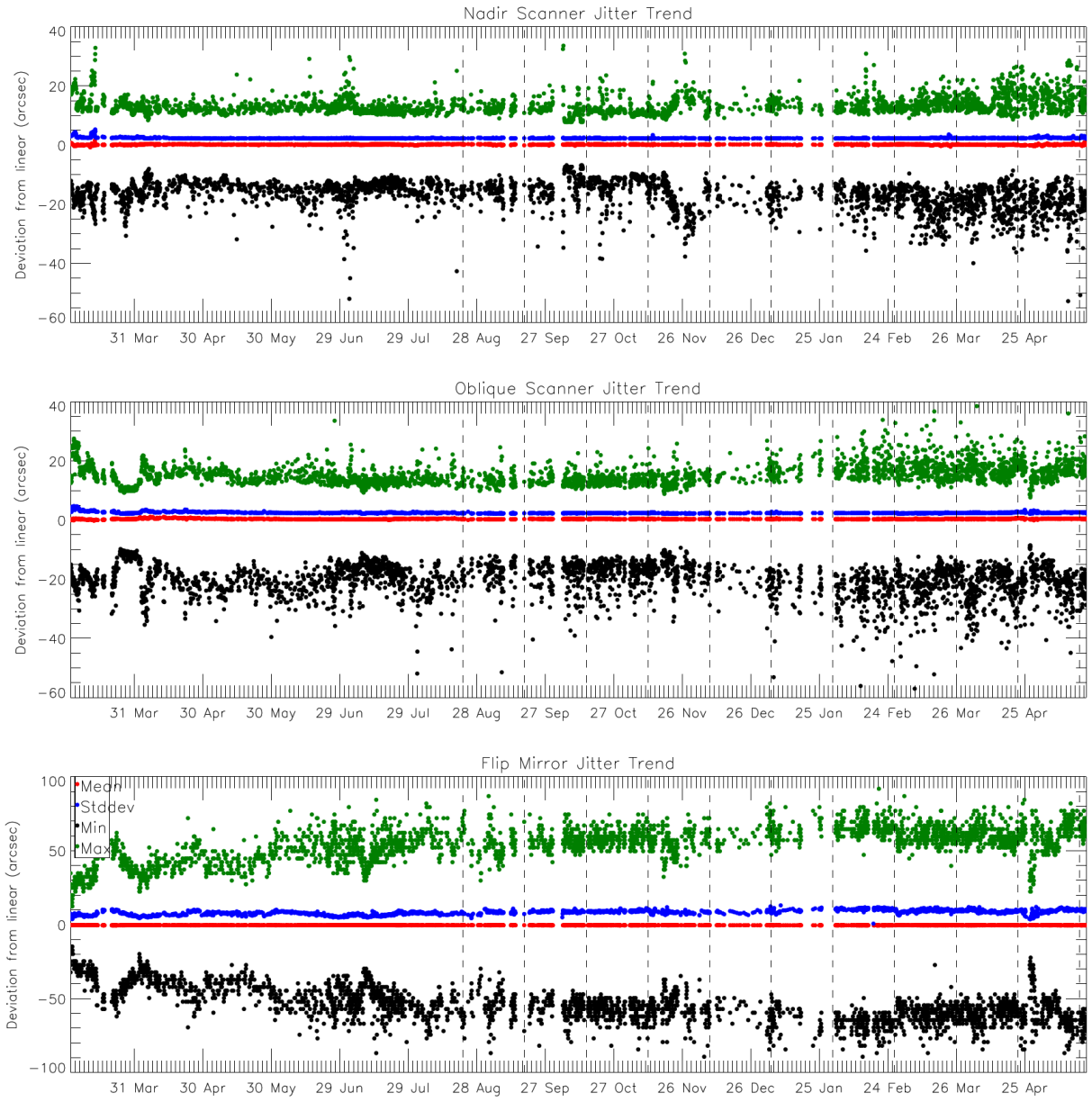

Figure 6: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the oblique view. The vertical dashed lines indicate the start and end of each cycle.

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.

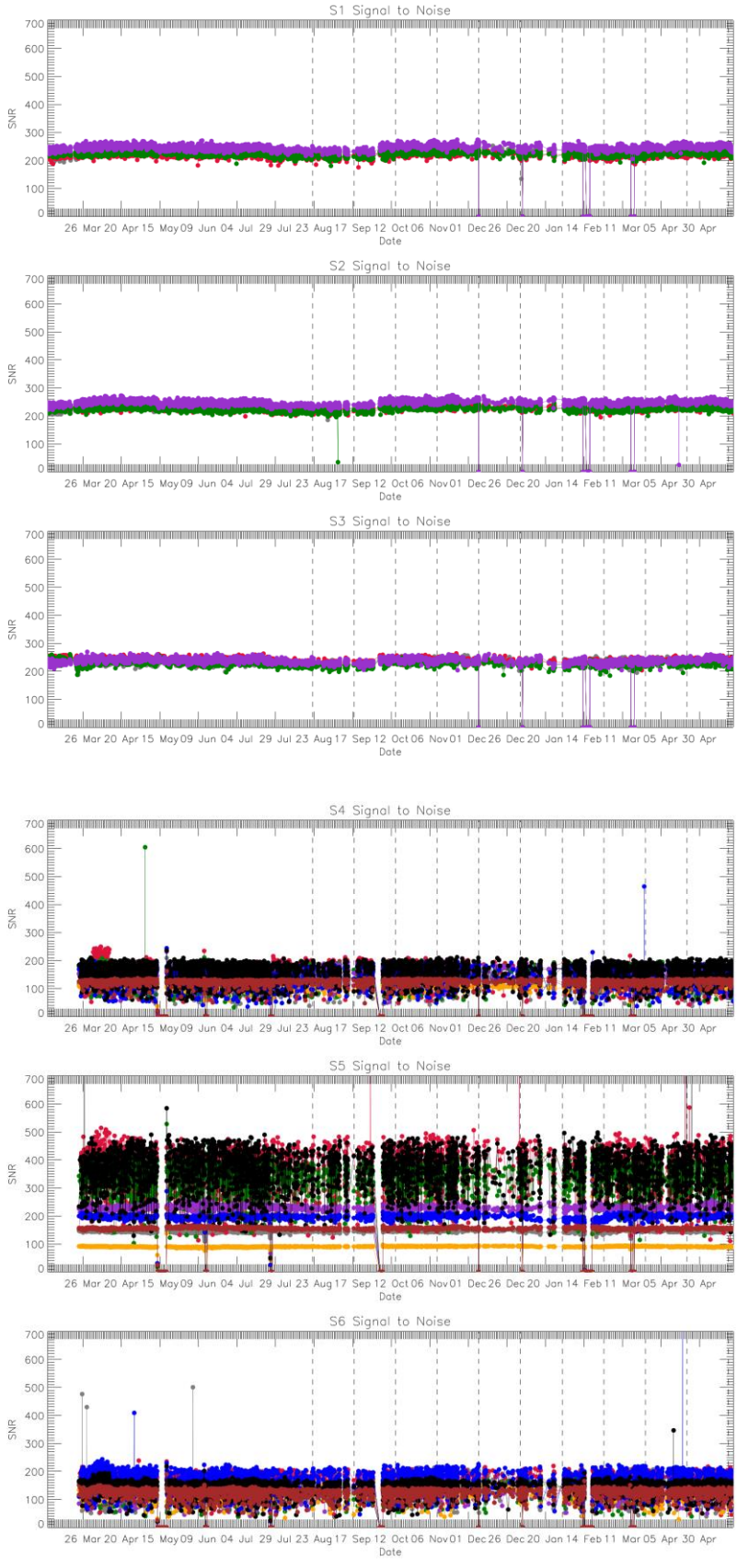

Figure 7: VIS and SWIR channel signal-to-noise. Different colours indicate different detectors.

1.3.2 TIR channel NEDT

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

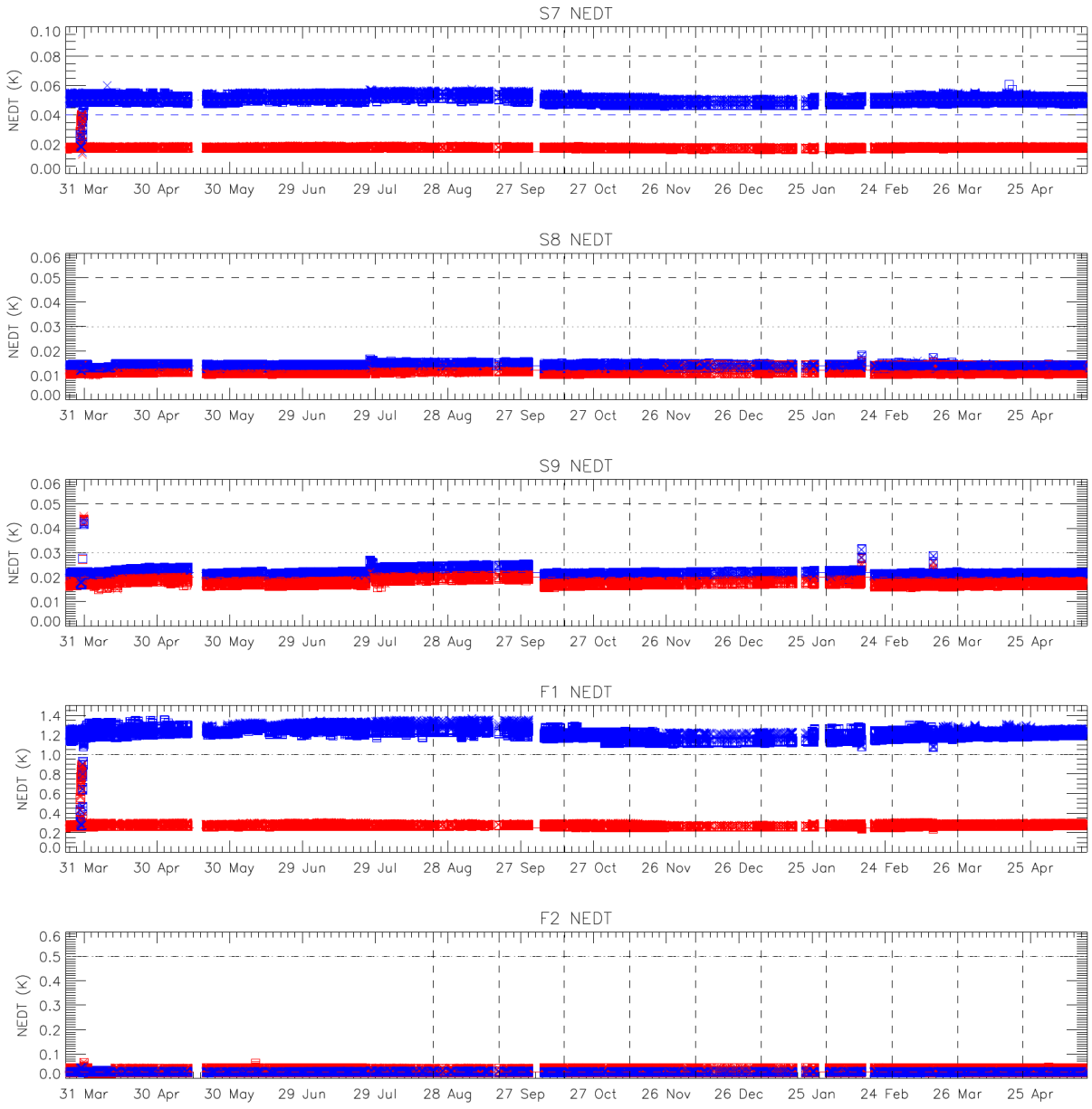

Figure 8: NEDT trend for the thermal channels. Blue points were calculated from the cold blackbody signal and red points from the hot blackbody. Horizontal lines indicate the requirement (dashed) and goal (dotted) as well as the measured values on ground (red and blue dashed).

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 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.

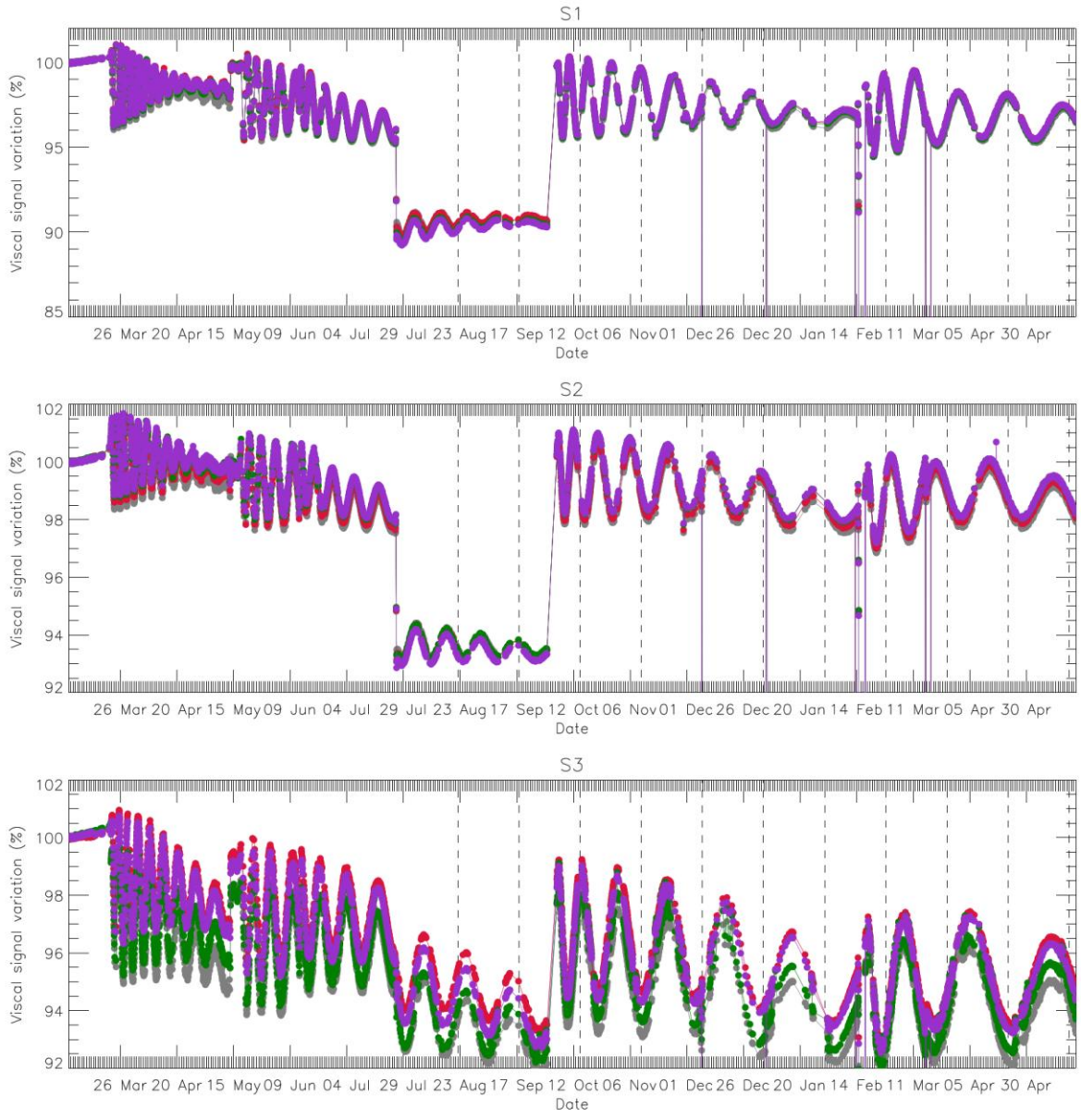

Figure 9: VISCAL signal trend for VIS channels (nadir view).

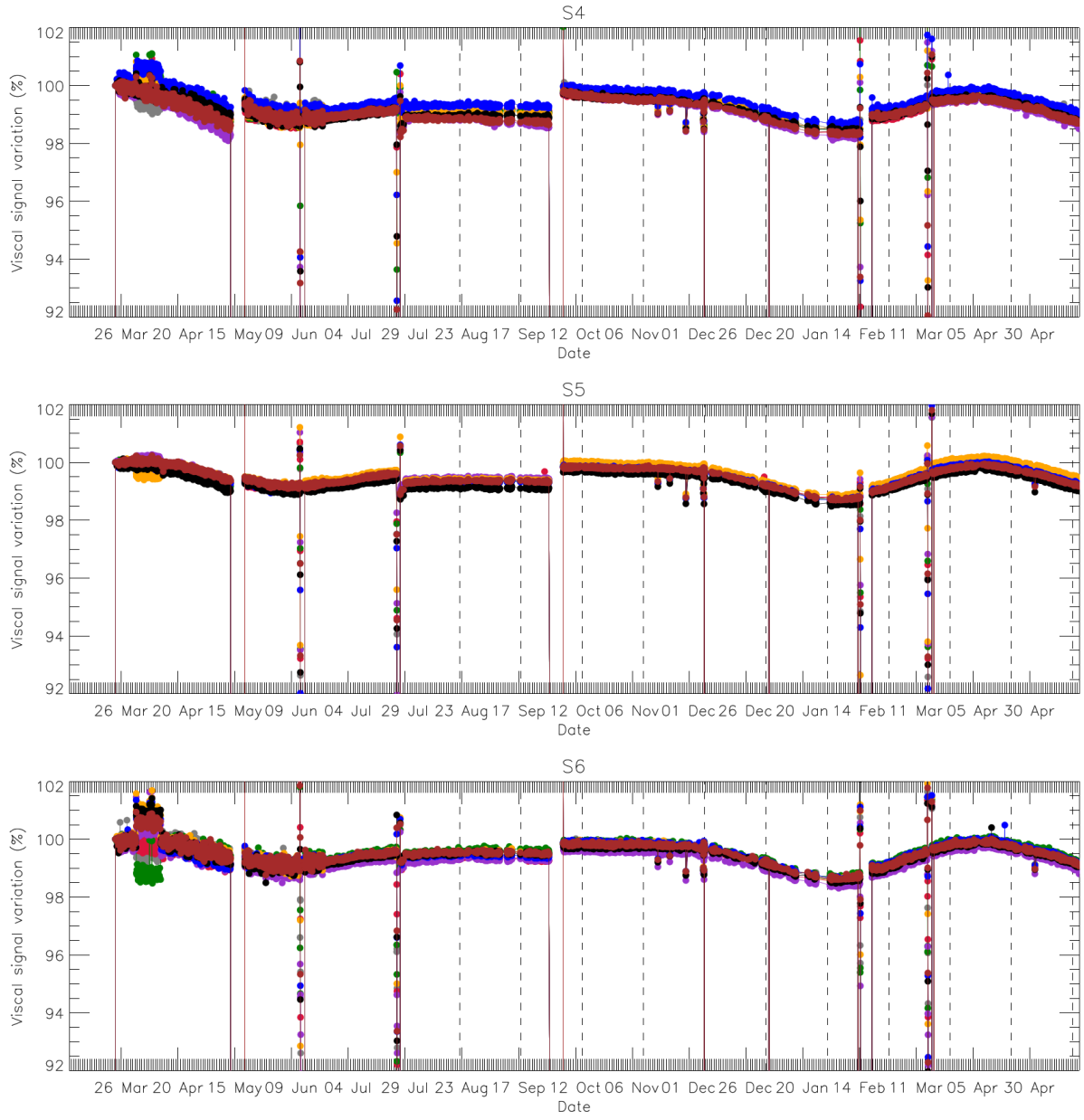

Figure 10: VISCAL signal trend for SWIR channels (nadir view).

1.5 Channel co-registration

The co-registration of Visible and SWIR channels was updated in the Sentinel 3 processor software in Processor Baseline 2.13. Data processed since this version was released on 4th May 2017 contain the updated relative positions for these channels. Validation of Processor Baseline 2.13 shows that the mis-registration between Visible and SWIR channels has been corrected from an average offset of 1 pixel to have no offset (see Figure 11).

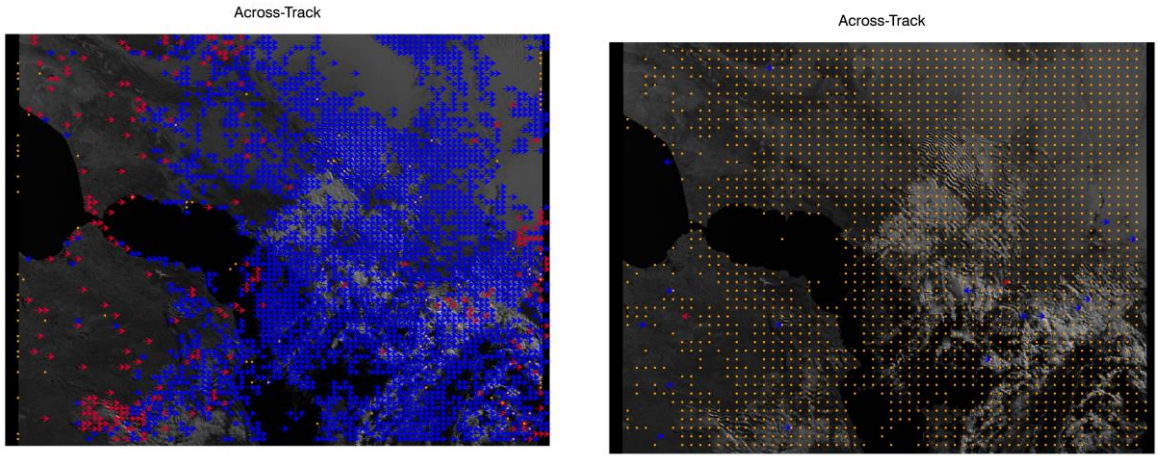

Figure 11: Across-track offsets between Visible and SWIR channels in a test scene observed in Nadir view. The coloured arrows/dots indicate the shift between channels at a series of control points in the image. Blue arrows indicate an offset of 1 pixel, red arrows indicate an offset of 2 pixels and the orange spots indicate no offset. The image on the left shows the results with the old software version, and the image on the right with Processor Baseline 2.13.

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 test:

- A temporary change to the SLSTR S8 FEE offset voltage was carried out over 3 orbits on 2nd May 2017 between 07:33:35 and 12:31:36. At the beginning and end of the test there is a short period of a few minutes when the settings were changed – this short period affected the temperatures of channels S4-S9 and caused a few minutes of un-usable data from all of those channels. During the 3 orbits of the test itself, only channels S8 and F2 are affected. The change in offset voltage for channel S8 was designed to test whether the dynamic range of that channel can be extended to lower brightness temperatures. It should not affect the absolute temperature calibration. The data are under analysis to determine whether the change can be applied permanently.

3 Appendix A

Other reports related to the Optical mission are:

- S3-A OLCI Cyclic Performance Report, Cycle No. 017 (ref. S3MPC.ACR.PR.01-017)

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

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