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

S3-A SLSTR Cyclic Performance Report

Cycle No. 019

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SENTINEL 3

Mission Performance Centre

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Author(s):	SLSTR ESLs		
Approved by:	D. Smith, SLSTR ESL Coordinator	**Authorized by**	Frédéric Rouffi, OPT Technical Performance Manager
Distribution:	ESA, EUMETSAT, S3MPC consortium		
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	17/07/2017	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 at the end of cycle 18 is due to the blackbody crossover test performed on 13th and 14th June.
- Blackbody, baffle and OME temperatures peaked around 3rd January when the Earth was at perihelion.

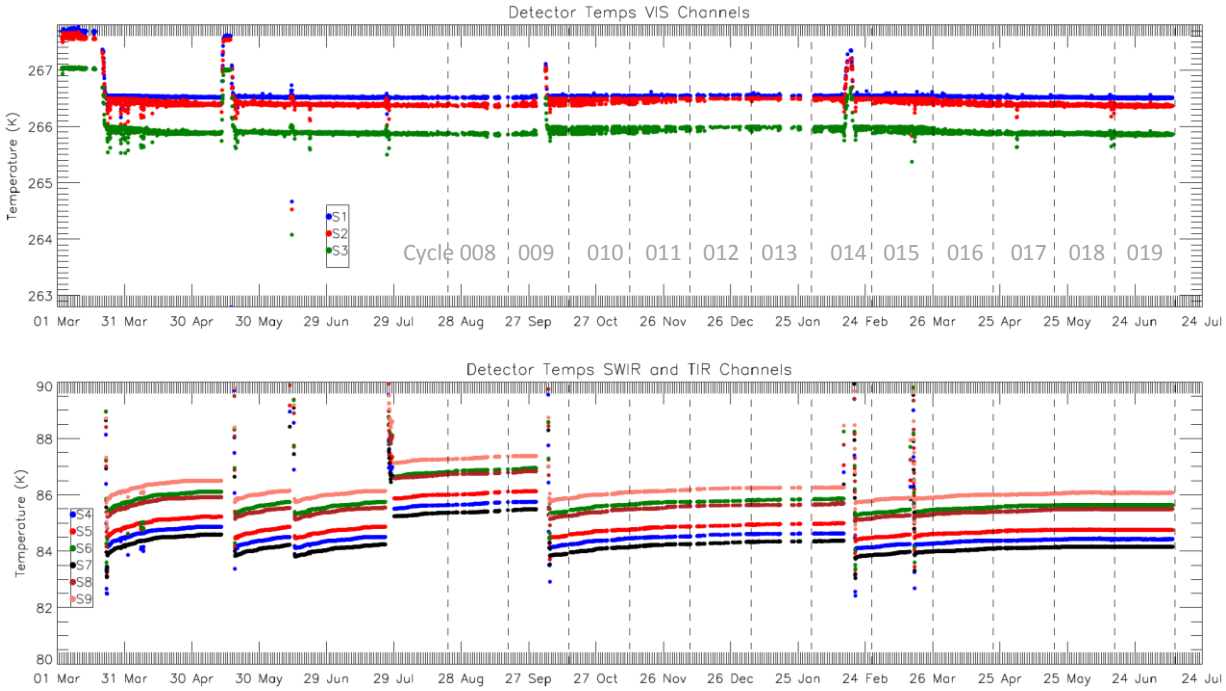

Figure 1: Detector temperatures for each channel from 1st March 2016. Discontinuities occur for the infrared channels where the FPA was heated for decontamination or following an anomaly. The vertical dashed lines indicate the start and end of each cycle.

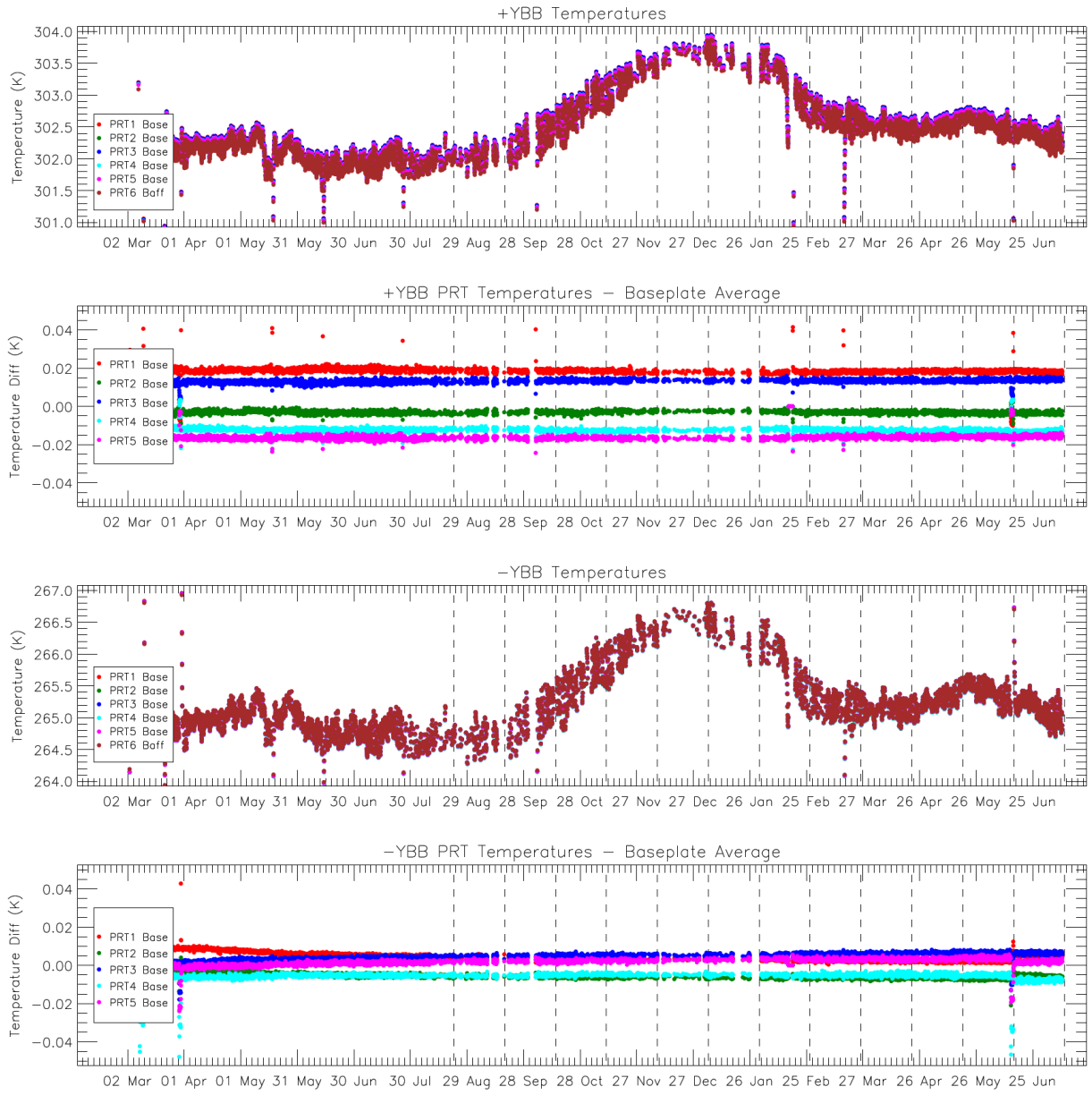

Figure 2: Blackbody temperature and baseplate gradient trends. The vertical dashed lines indicate the start and end of each cycle.

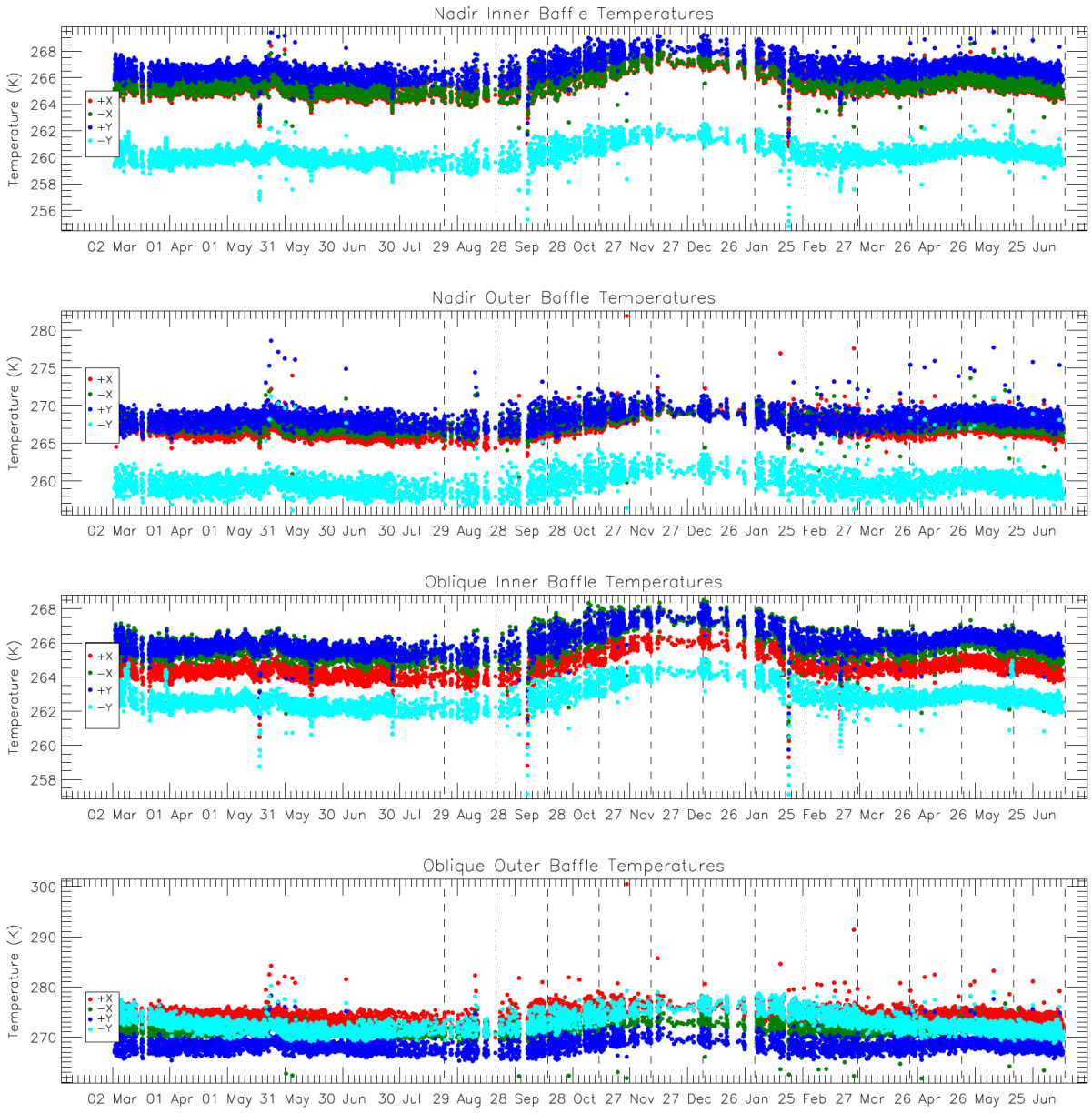

Figure 3: Baffle temperature trends. The vertical dashed lines indicate the start and end of each cycle.

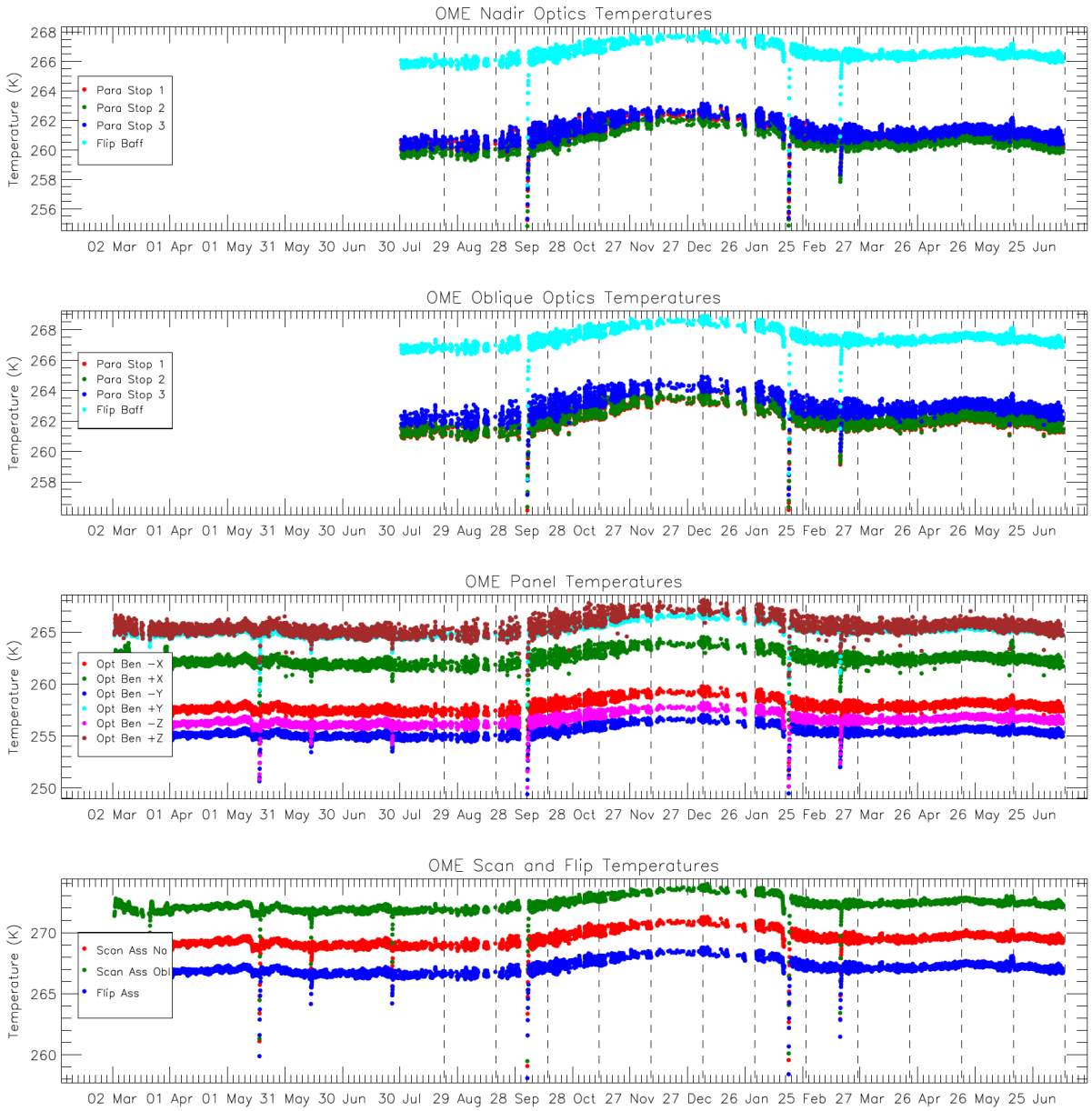

Figure 4: OME temperature trends showing the paraboloid stops and flip baffle (top two plots) and optical bench and scanner and flip assembly (lower two plots). The top two plots only show data starting from 30th July 2016. The vertical dashed lines indicate the start and end of each cycle.

1.2 Scanner performance

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

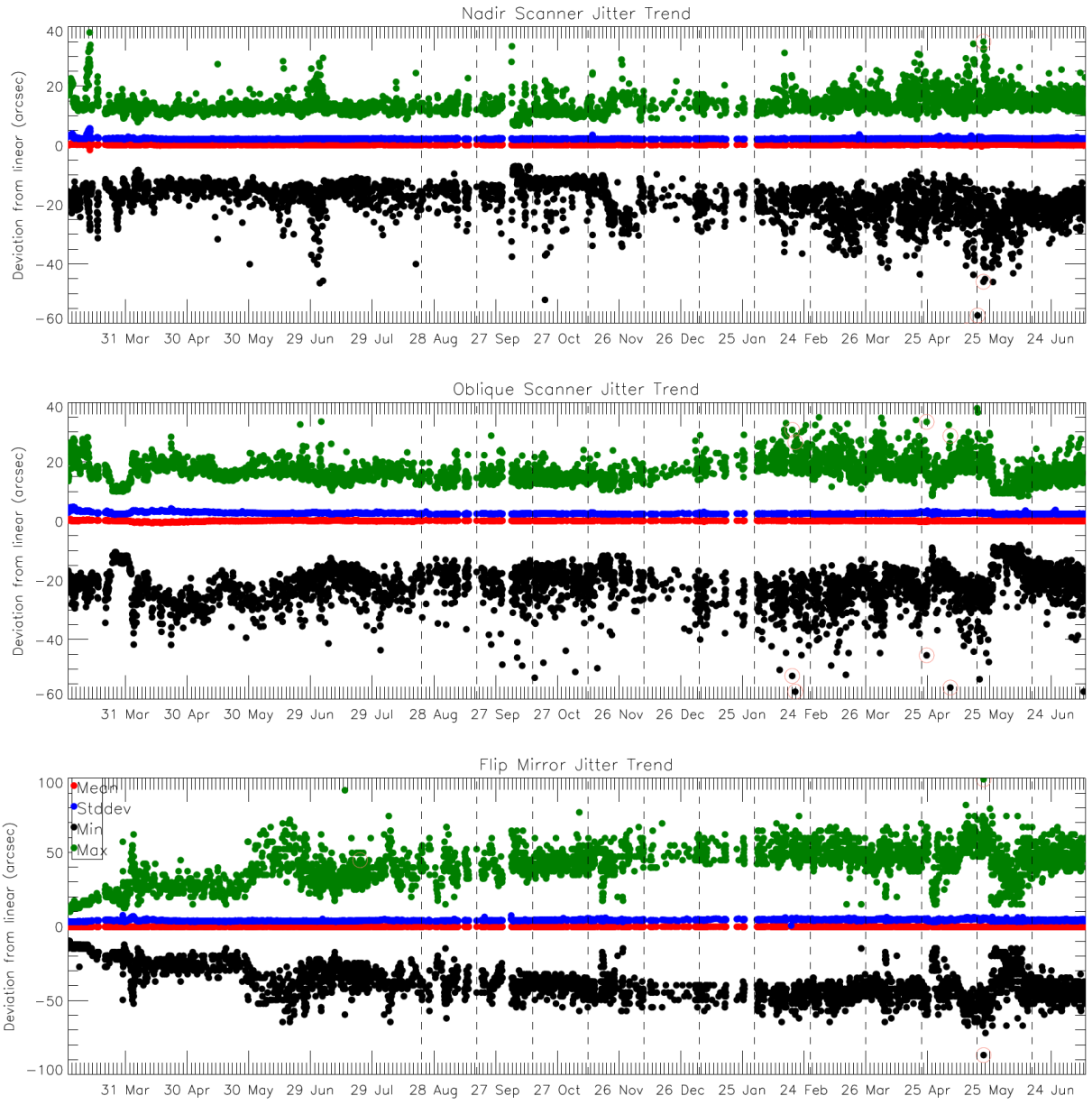

Figure 5: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the nadir view. The vertical dashed lines indicate the start and end of each cycle.

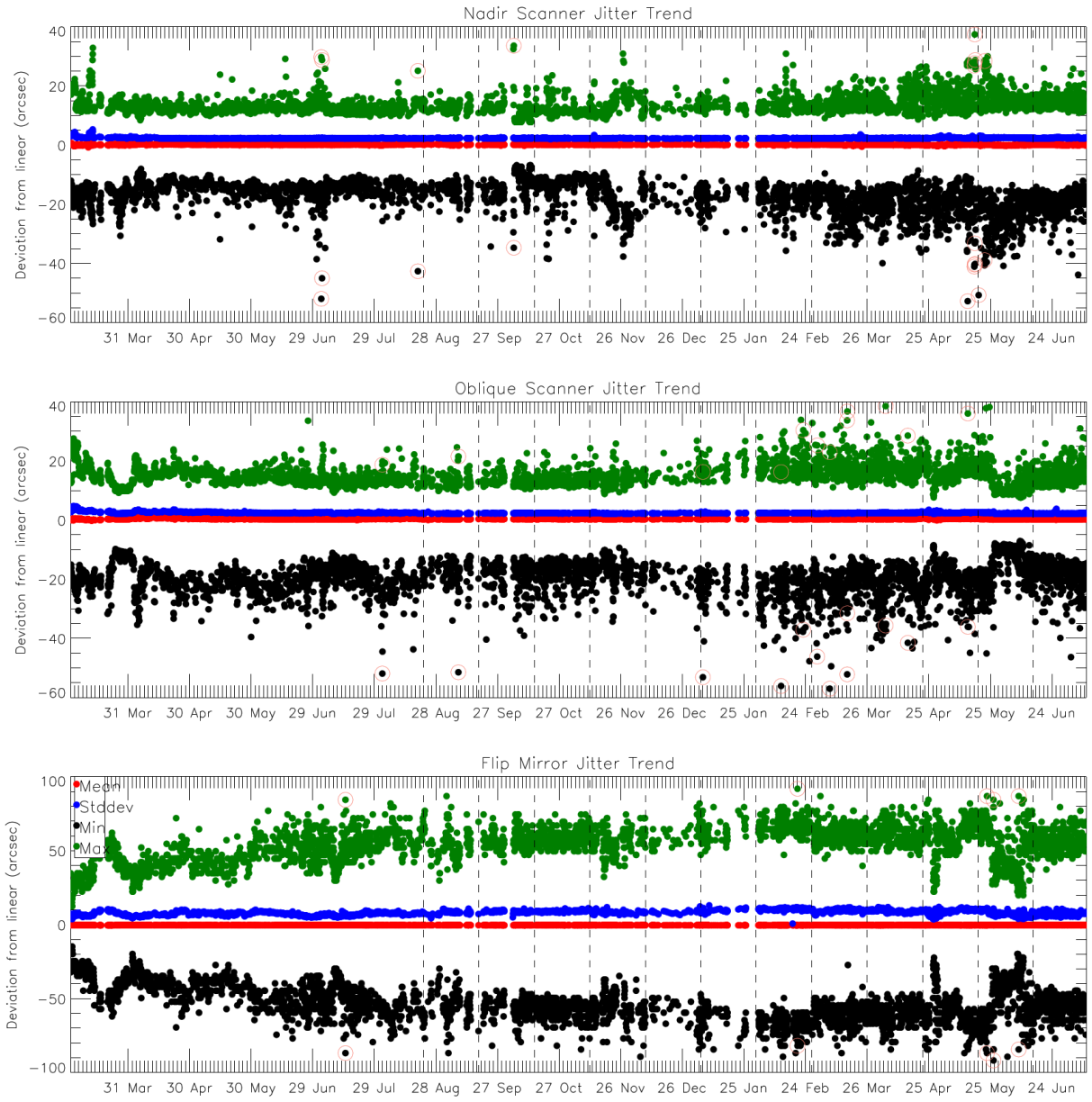

Figure 6: Scanner and flip jitter, showing mean, stddev and max/min position compared to the expected one for the oblique view. The vertical dashed lines indicate the start and end of each cycle.

1.3 Detector noise levels

1.3.1 VIS and SWIR channel signal-to-noise

The VIS and SWIR channel noise is stable and consistent with previous operations as shown by the signal-to-noise ratio of the measured VISCAL signal in Figure 7. Table 1 and Table 2 give the average signal-to-noise in each cycle (although note that this averages over the significant detector-detector dispersion for the SWIR channels that is shown in Figure 7).

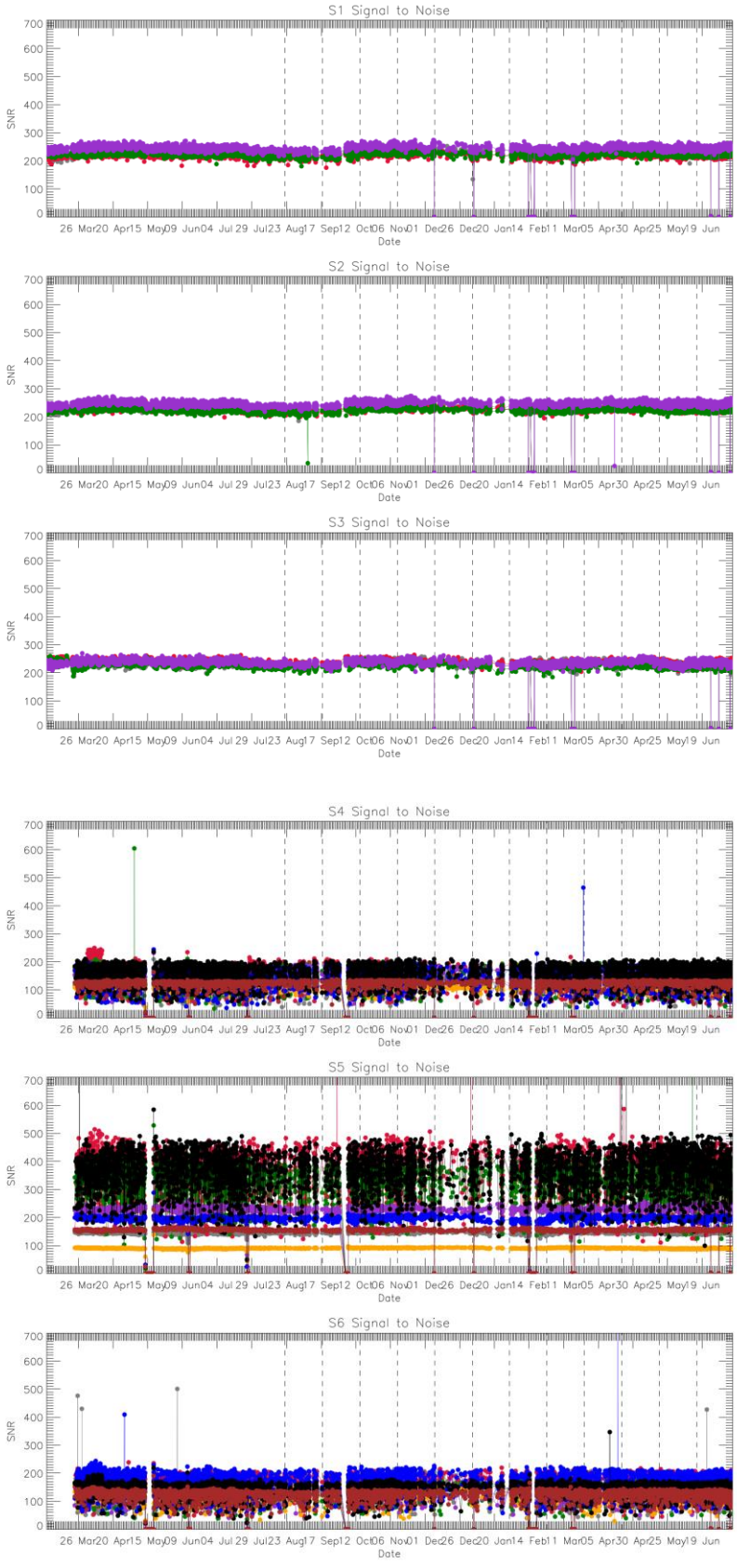

Figure 7: VIS and SWIR channel signal-to-noise of the measured VISCAL signal in each orbit. Different colours indicate different detectors.

Table 1: Average reflectance factor, and signal-to-noise ratio of the measured VISCAL signal for cycles 008-019, averaged over all detectors for the nadir view.

	Average Reflectance Factor	Nadir Signal-to-noise ratio											
		Cycle 008	Cycle 009	Cycle 010	Cycle 011	Cycle 012	Cycle 013	Cycle 014	Cycle 015	Cycle 016	Cycle 017	Cycle 018	Cycle 019
S1	0.187	221	229	236	235	233	226	217	224	233	234	231	229
S2	0.194	223	233	238	238	236	234	227	230	236	236	232	231
S3	0.190	226	235	238	239	235	230	221	230	236	238	228	231
S4	0.191	139	141	141	145	141	139	137	139	142	140	140	139
S5	0.193	230	235	236	235	238	234	234	233	233	235	236	233
S6	0.175	139	140	143	147	145	143	141	144	142	143	143	142

Table 2: Average reflectance factor, and signal-to-noise ratio of the measured VISCAL signal for cycles 008-019, averaged over all detectors for the oblique view.

	Average Reflectance Factor	Oblique Signal-to-noise ratio											
		Cycle 008	Cycle 009	Cycle 010	Cycle 011	Cycle 012	Cycle 013	Cycle 014	Cycle 015	Cycle 016	Cycle 017	Cycle 018	Cycle 019
S1	0.166	228	242	249	249	247	238	229	236	243	247	246	242
S2	0.170	236	247	254	253	250	241	232	241	248	251	249	247
S3	0.168	245	249	251	251	244	237	227	236	245	249	244	242
S4	0.166	110	107	109	112	112	108	107	108	108	111	110	109
S5	0.166	165	168	173	173	173	169	169	172	169	169	171	168
S6	0.155	108	111	110	114	113	105	106	107	109	109	110	108

1.3.2 TIR channel NEDT

The thermal channel NEDT values are consistent with previous operations and within the requirements. NEDT for each cycle, averaged over all detectors and both Earth views, are shown in Table 3 and Table 4.

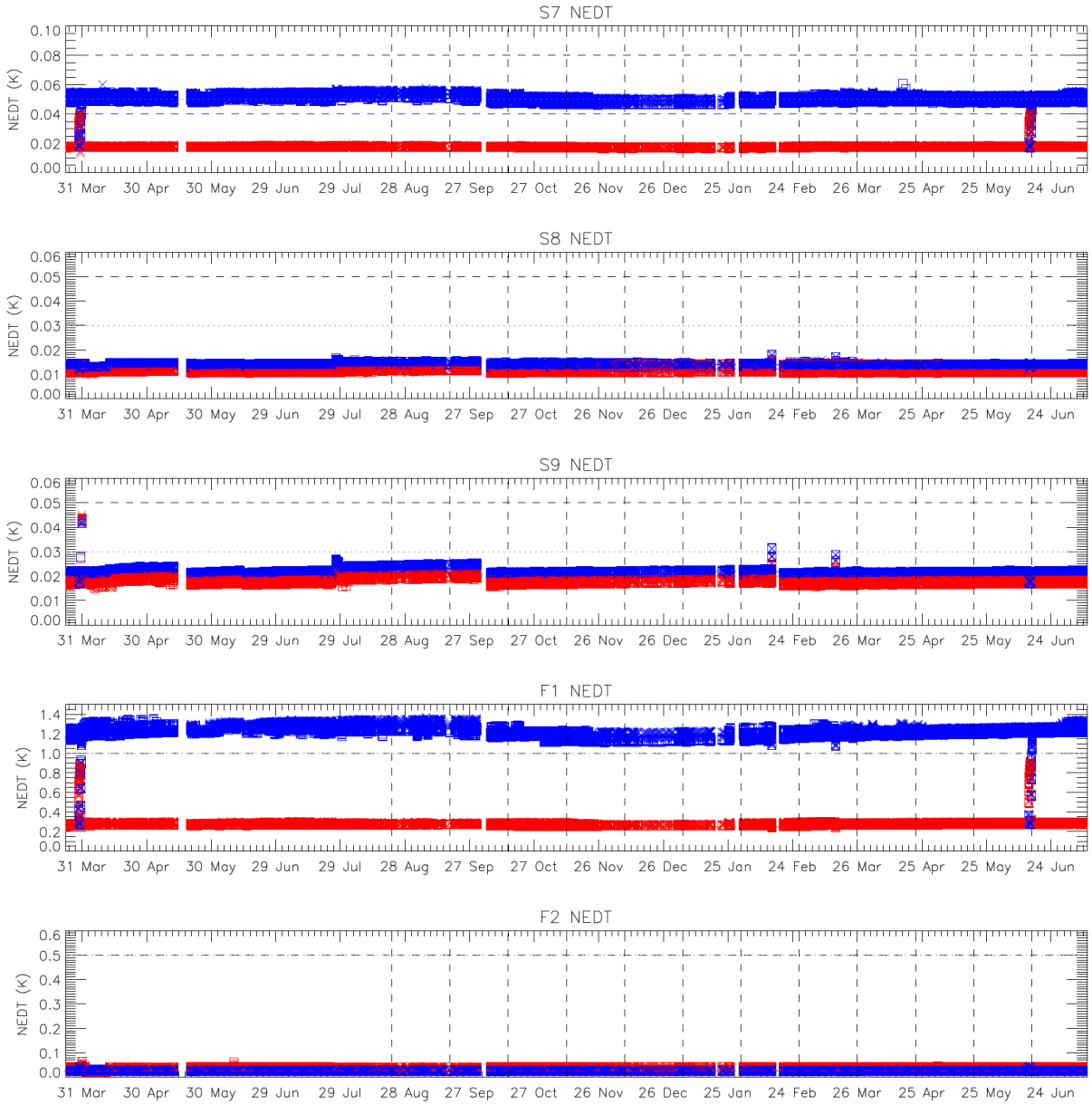

Figure 8: NEDT trend for the thermal channels. Blue points were calculated from the cold blackbody signal and red points from the hot blackbody. Horizontal lines indicate the requirement (dashed) and goal (dotted) as well as the measured values on ground (red and blue dashed).

Table 3: NEDT for cycles 008-019 averaged over all detectors for both Earth views towards the +YBB (hot).

		Cycle 008	Cycle 009	Cycle 010	Cycle 011	Cycle 012	Cycle 013	Cycle 014	Cycle 015	Cycle 016	Cycle 017	Cycle 018	Cycle 019
+YBB temp (K)		302.080	302.381	302.822	303.289	303.680	303.621	303.206	302.674	302.544	302.541	302.593	302.386
NEDT (mK)	**S7**	17.5	17.3	17.2	16.9	16.9	16.8	16.9	17.2	17.2	17.2	18.1	17.2
	S8	11.8	11.3	10.9	11.0	11.0	11.1	11.0	10.9	10.9	11.0	11.1	11.0
	S9	19.5	18.1	17.1	17.4	17.7	17.9	17.6	17.0	17.0	17.2	17.5	17.4
	F1	28.3	269	265	260	260	260	260	268	268	271	297	276
	F2	17.5	27.7	27.5	27.7	28.0	28.0	27.9	27.6	27.6	27.8	27.8	27.8

Table 4: NEDT for cycles 008-019 averaged over all detectors for both Earth views towards the –YBB (cold).

		Cycle 008	Cycle 009	Cycle 010	Cycle 011	Cycle 012	Cycle 013	Cycle 014	Cycle 015	Cycle 016	Cycle 017	Cycle 018	Cycle 019
-YBB temp (K)		264.683	265.020	265.575	266.112	266.512	266.353	265.807	265.183	265.136	265.260	265.412	265.125
NEDT (mK)	**S7**	51.1	49.3	48.1	47.2	46.6	46.8	47.9	48.7	49.0	48.8	46.9	49.1
	S8	15.3	14.7	14.4	14.4	14.5	14.4	14.4	14.2	14.2	14.3	14.2	14.3
	S9	24.7	22.7	21.5	21.8	22.2	22.4	22.1	21.3	21.4	21.6	21.6	21.9
	F1	1230	1220	1209	1162	1123	1130	1178	1222	1191	1199	1163	1229
	F2	31.8	30.2	29.3	29.5	29.6	29.6	29.6	29.2	29.3	29.3	29.4	29.6

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.

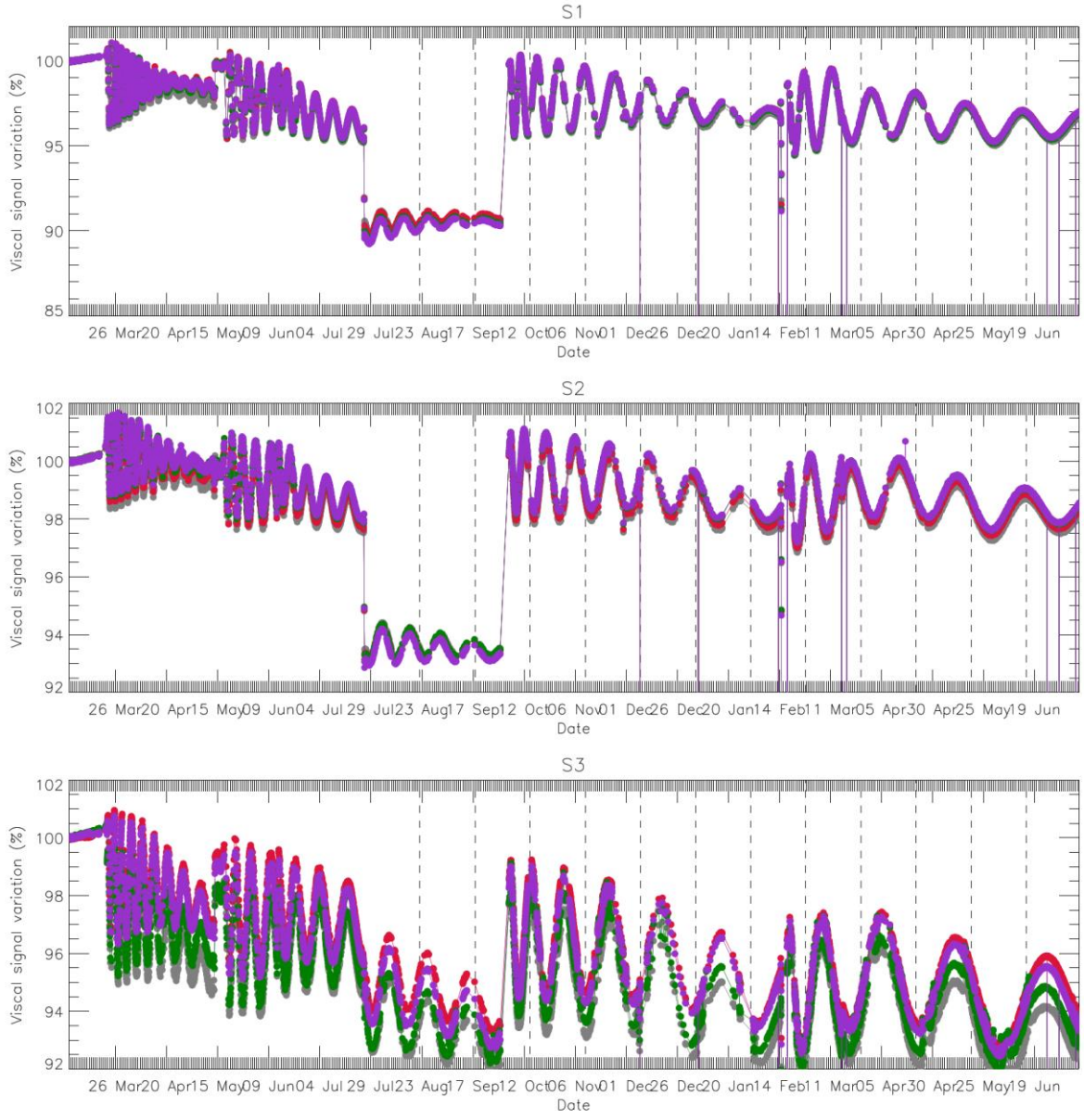

Figure 9: VISCAL signal trend for VIS channels (nadir view).

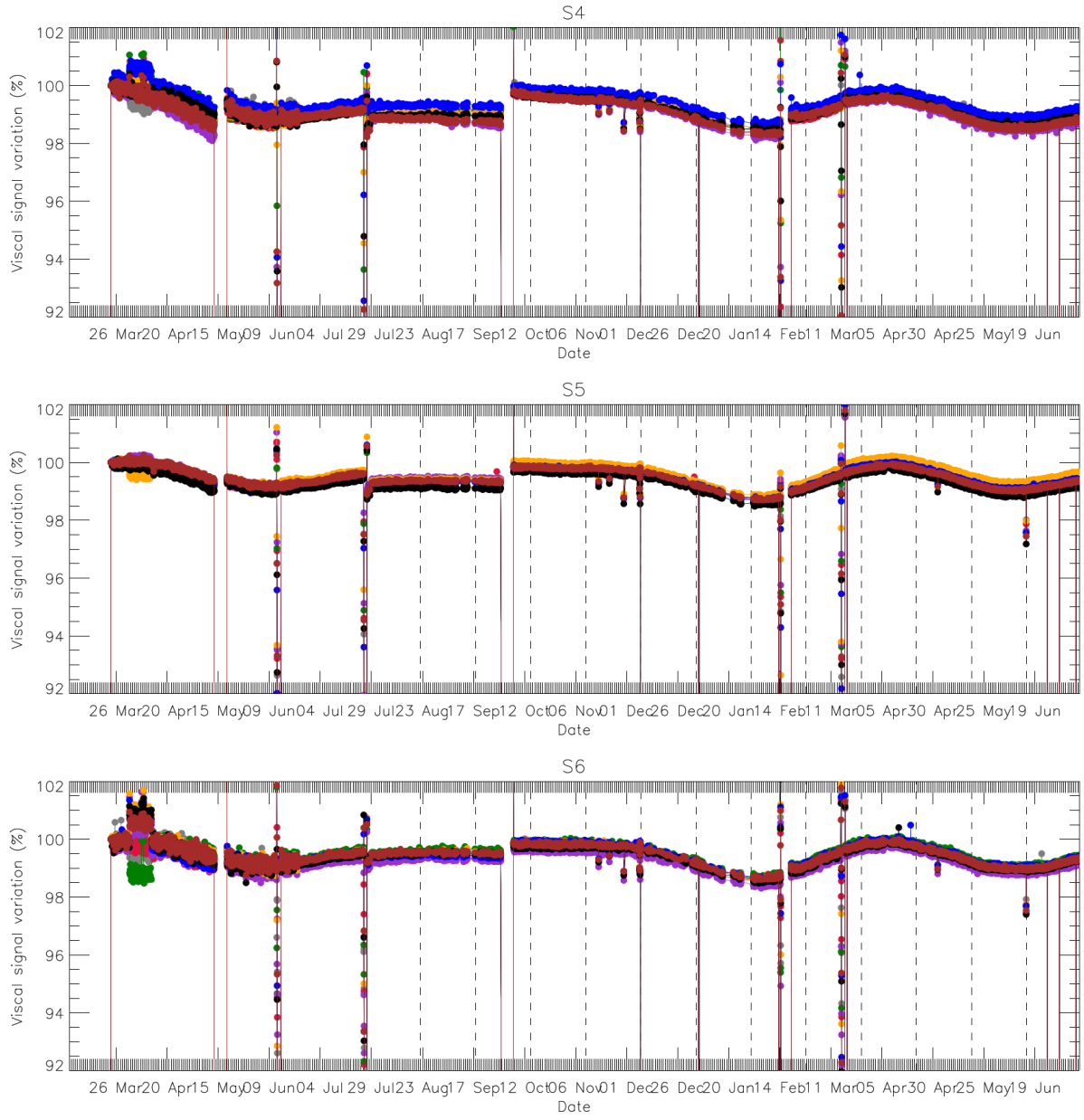

Figure 10: VISCAL signal trend for SWIR channels (nadir view).

2 Events

SLSTR has been switched on and operating nominally during the cycle, with SUE scanning and autonomous switching between day and night modes. However, it should be noted that following the blackbody crossover test at the end of Cycle 18, the temperatures were still recovering into Cycle 19 until the 15th June. The timings of the blackbody crossover test were as follows:

Date and approximate time	Event
13th June 2017 11:05	Start heating of –YBB and cooling of +YBB
13th June 2017 12:45	Temperatures of –YBB and +YBB crossed at T = 289K
13th June 2017 21:50	–YBB stabilized at 303K (+YBB at 273K)
14th June 2017 15:36	Start heating of +YBB and cooling of –YBB
14th June 2017 16:47	Temperatures of –YBB and +YBB crossed at T = 290K
15th June 2017 07:30	Both BBs stable with normal configuration (+YBB at 302.5K and –YBB at 265.7K)

3 Appendix A

Other reports related to the Optical mission are:

- S3-A OLCI Cyclic Performance Report, Cycle No. 019 (ref. S3MPC.ACR.PR.01-019)

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

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