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Solar Orbiter Mission Operations Report #3

Period [02 March 20 - 08 March 20]

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Table of contents

1	SUMMARY OF ACTIVITIES	5
2	SATELLITE STATUS	6
2.1	Platform.....	6
2.1.1	AOCS / propulsion	6
2.1.2	Mechanisms.....	7
2.1.3	TT&C.....	7
2.1.4	Thermal	8
2.1.5	Power	8
2.1.6	Data handling.....	9
2.2	Instruments.....	10
3	GROUND FACILITIES.....	11
3.1	Ground Stations	11
3.2	Control Centre.....	11
4	SPECIAL EVENTS	12
5	ANOMALIES	13
6	FUTURE MILESTONES.....	14

1 SUMMARY OF ACTIVITIES

Payload commissioning week 2 is complete.

Correction to MOR 1: Venus flyby is planned at 2020-362T12:37:16.000Z (ie 27/12/2020).

DoY	Date	Activity
62	02/03/2020	<i>STP 2 start</i> EPD interactive EUI interactive PHI interactive OMM file clean up
63	03/03/2020	EUI interactive PHI interactive SoloHI interactive WOL 00:00 to 03:00
64	04/03/2020	SWA interactive
65	05/03/2020	SoloHI interactive SPICE interactive WOL 04/03 23:53 to 02:52
66	06/03/2020	Metis interactive SA relubrication 14:06 to 14:13
67	07/03/2020	WOL 06/03 23:43 to 02:43
68	08/03/2020	CPS purging 00:30 to 09:19

The table above only reports interactive activities. Many non-interactive activities run throughout the week for multiple instruments.

At the end of the reporting period (DoY 068, 08/03) Solar Orbiter was at:

- **12.3** million km from the Earth (0.08 AU); the one-way signal travel time was 0 min 41 sec (41 sec).
- **145** million km from the Sun (0.97 AU).

2 SATELLITE STATUS

2.1 Platform

2.1.1 AOCS / propulsion

The AOCS configuration at the end of the reporting period is:

- AOCS in NCM mode
 - with attitude control based on Wheels (all 4 Wheels)
 - using the gyro stellar estimator (GSE) on STEADY gains
 - with inertial reference attitude guidance
- AOCS Sensors
 - IMU A (all 4 Channels) ON and IN-USE
 - IMU B (all 4 Channels) OFF and all 4 Channels PRESELECTED
 - ACC (all 4 Channels) OFF
 - FSS A (XP and ZM) ON and IN-USE, with FSS A XP having SUN Presence
 - FSS B (XP and ZM) OFF
 - STR A ON (NEAT mode) and IN-USE
 - STR B OFF

STR defective pixels check discussion [is on-going](#).

Lost in space acquisition tests open behaviors are further being investigated with ADS.

The STR triangular shaped object (artefact) is further being discussed with ADS.

AOCS Actuators

- RW 1-4 ON and IN-USE used for Attitude Control since DoY 042 and LEOP day 1
- RW Momentum Target Levels @ 18/-18/-18/18 Nms
- CPS B OFF and PRESELECTED, CPS A OFF
- AOCS Flags
 - Sun Distance set to FAR since launch
 - Flyby set to NO FLYBY since launch
- AOCS HK and TM mode configuration: Default since DoY 052 (21/02/2020)

- Propulsion system
 - Valves in default configuration (all TLVs + LFLV closed, except for LFLV 3+4)
 - The propulsion system is configured in regulated mode since launch
 - The pressure relief function is activated when needed
 - Pressure levels
 - NTO tank pressure @ 16.5 bar
 - MMH tank pressure @ 16.45 bar
 - HE tank pressure @ 150 bar

2.1.2 *Mechanisms*

- SADE
 - SADE A ON and IN-USE
 - SADE B OFF

- HGA APME
 - HGA Deployment Status = TRUE
 - HGA selected as PRIME Antenna (PM and SGM RAM)
 - APME A OFF and PRESELECTED
 - APME B OFF

- MGA APME
 - MGA Deployment Status = TRUE
 - MGA will be selected as PRIME Antenna (SGM RAM) on DoY 058
 - APME A OFF and PRESELECTED
 - APME B OFF

2.1.3 *TT&C*

The performance of the subsystem is nominal

- TRSP-1 X-band up and down via HGA, 4 kbps uplink, downlink bit rate is selected according to the used ground station
- TWTA-1 is in use, RF power nominal (from Helix Current telemetry reading)
- TRSP-2 back-up uplink is configured for X-band reception at 7.8 bps via LGA-2 since DoY 044 13/02/2020
- TWTA-2 is OFF and in cold redundancy
- MGA is selected as safe mode antenna since DoY 058.
- PN ranging is fully validated and used by default since DoY 057 (26/02). This allows to currently be on the max TM bit rate.



2.1.4 Thermal

TL97 (MAG OBS) latest setting is a regulation (in RAM only) of -90 to -88 degC.

Thermal configuration is configured for the op range for some instruments (decontamination heaters were not touched).

2.1.5 Power

The subsystem is in its nominal configuration and performing nominally.

- PCDU A OFF
- PCDU B ON and in use

PCDU A EEPROM tables are pending final clean up.

2.1.6 *Data handling*

The subsystem is in its nominal hardware and software configuration.

The SSMM is ON and fully configured in 3 MM Configuration.

The TC Link Monitor is configured with a time-out of 3 days.

Configuration for cruise is now set as follows (TC link TH1/TC link TH1 increase/TC link TH2):

PM RAM: 72h/24h/142h

SGM RAM: 72h/12h/106h

The TM generation mode is configured to NOMINAL.

SSMM ASW 02.07.00 was uploaded on DoY 052 in both ASW images and both supervisors.

SOL_SC-30 [Loss of TCs during file transfer] was raised. Investigations continue. Current assumption is a timing issue with the need to add a small delta release time to FT TCs.

The current DMS configuration is:

Item	A	B
OBC PM	Active	Off
OBC CSW Image Select	0	0
OBC CSW Version	3.0.3p1	3.0.3p1
OBC EEPROM Segs	1 : Code 2: Data 3-8 : Profiles	1 : Code 2: Data 3-8 : Profiles
RM PAP Prog. Set	1 (PM-A Nominal)	1 (PM-A Nominal)
RM	Enabled	Enabled
SSMM SV	Active	Off
SSMM ASW Image	1	1
SSMM ASW Version	02.07.00	02.07.00
RIU	Active	Off
OMM	On and in use (slave)	On and in use (Master)

2.2 Instruments

EPD

Nothing to report.

EUI

The self-test (EUI-2b) on 02/03 was successful.

All EUI-3 activities completed successfully on 03/03 with first dark images as expected.

AR SOL_SC-29 was raised with a workaround in place for the EUV filter wheel commanding.

MAG

Thermal investigations continue.

METIS

METIS IT-2 activities completed successfully on 06.03. The instrument is OFF at the end of the reporting period, with decontamination heaters on.

PHI

PHI door was successfully opened on 03/03.

PHI flat field calibration on 19/03 is cancelled. PHI NECP re-planning activities are on-going.

RPW

Investigations on issues reported in previous MORs continue.

SWA

SWA flight software was successfully loaded onto the SWA redundant side on 04/03. SWA was switched off at the end of the activity.

AR SOL_SC-31 was raised. SWA boot HK should be routed to the SSMM, not the OBC.

SoloHi

All activities of the week were conducted successfully.

SPICE

Functional Tests – Part 1 completed successfully on 05/03.

STIX

Nothing to report. Not switched on yet.



3 GROUND FACILITIES

3.1 Ground Stations

During the reporting period mission operations have been conducted with the CEB ESA stations

PN ranging is fully validated and applies.

3.2 Control Centre

Solo MCS SW version D3.15.9 is used on all operational machines since week 08/2020. This version uses:

- GFTS SW version 3.1.6
- EDDS SW version 2.3.0
- NIS SW version 5.2.0
- FARC SW version 3.2.1

MATIS (our automation tool) is used since 14/02 (DoY 045) to manage all links to the ground stations.

MCS issues related to SC file transfer, OOL management of the offline datastream and data gap issues (including EDDS) are further being investigated.



4 SPECIAL EVENTS

None



5 ANOMALIES

The following Anomaly Reports were raised in the reporting period:

Spacecraft

SOL_SC-31	SWA Boot HK routed to OBC, but SSMM expected
SOL_SC-30	Loss of TCs during file transfer
SOL_SC-29	EUI CMD ZIU51747 failed during EUI-2a activity in NECP

Ground Segment

None

Non Conformance Reports

None



6 FUTURE MILESTONES

This is the timeline of future milestones:

Milestone	Date	Comment
Start of PL NECP week 3		
	DoY 069, 09/03/20	SPICE interactive and non EPD non-interactive SWA interactive MAG/RPW non interactive SPICE D-heater OP WOL 20:06 to 23:06
	DoY 070, 10/03/20	SPICE non-interactive SWA interactive EUI interactive Open HS door EUI Uplink of IU-4_1-3a. WOL 00:00 to 03:00
	DoY 071, 11/03/20	SPICE non-interactive EPD non-interactive SWA interactive EUI non-interactive WOL from 19:55 to 22:55
	DoY 072, 12/03/20	SPICE non-interactive EUI non-interactive SWA interactive METIS D-heater OFF
	DoY 073, 13/03/20	SPICE non-interactive EPD non-interactive METIS interactive EUI non-interactive METIS Open door and CAP release METIS D-heater ON WOL from 19:49 to 22:49
	DoY 074, 14/03/20	SPICE non-interactive EUI non-interactive
	DoY 075, 15/03/20	EUI non-interactive SPICE non-interactive In-orbit thermal correlation
Beyond		
	DoY 088, 28/03/20	De-icing slew is cancelled. It was wrongly scheduled < 0.95 AU.