1 General Comments

Activities scheduled for this week are those planned for the 47th calendar week of 2019:

18 NOV 2019 to 25 NOV 2019 (DOYs 322 to 329).

The following routine activities were planned this week (see Gantt chart on next page and CRF 848).

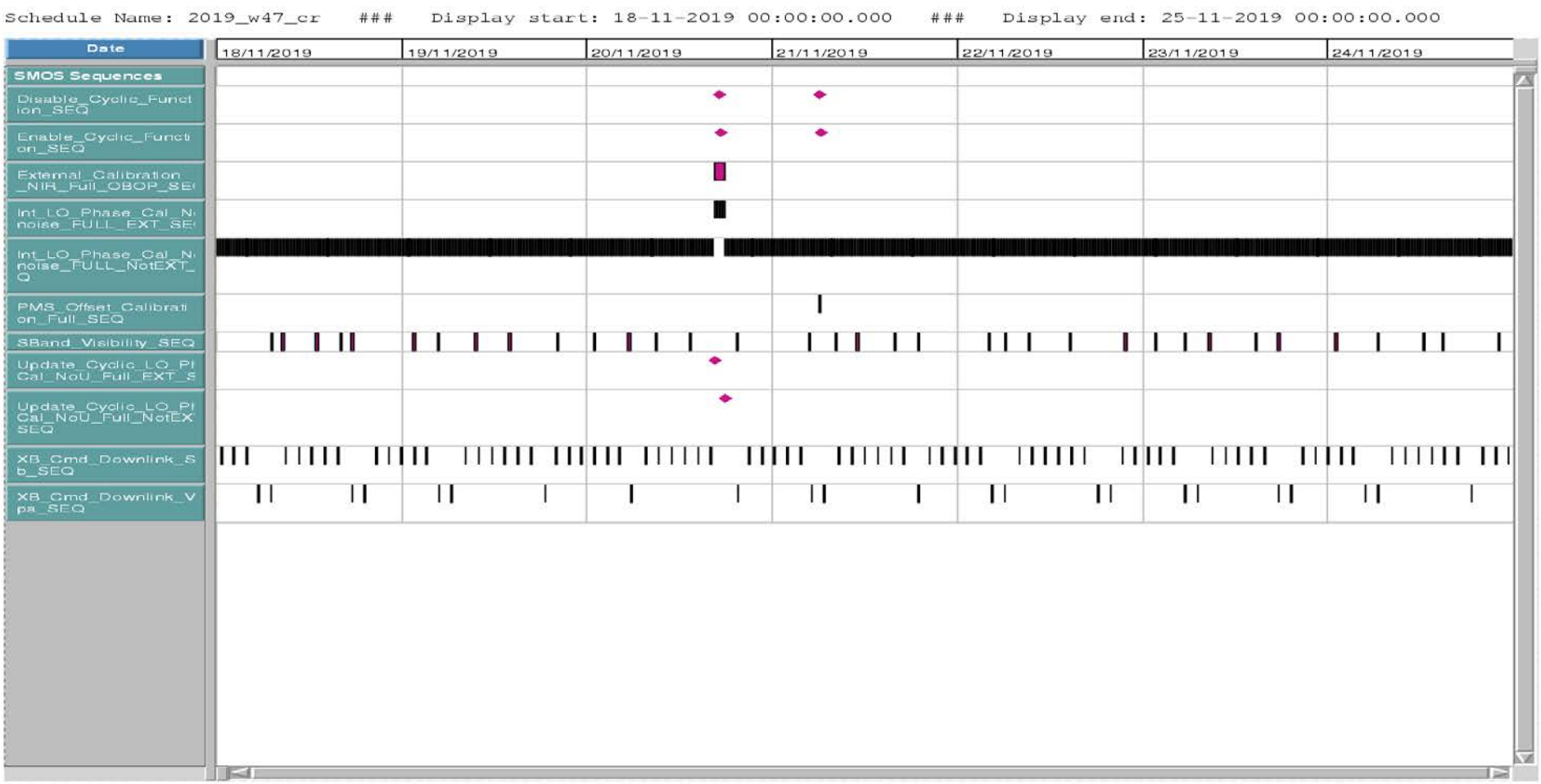
- One Warm NIR Calibration on 20 NOV 2019 (DOY 324) with ETO 17:12:30z (orbit 52817; ASCENDING: thermally STABLE) and with the following expected calibration values:

```
B.T.           =    3.76º
R.M.S.         =    0.51
Sun elevation  =    9.99º
Moon elevation =   61.68º
R.A.           =  150.95º
DEC.           =  -13.08º
```

- One PMS Offset on 21 NOV 2019 (DOY 325), including three Short Calibrations at 06:10:00.0z, 06:10:34.8z, and 06:11:09.6z (orbit 52825).
- Local Oscillator Calibrations every 10 minutes.
- *X* band Passes over ESAC and Svalbard.

2 Mission Planning Deviations

None.


Schedule Name: 2019_w47_cr ### Display start: 18-11-2019 00:00:00.000 ### Display end: 25-11-2019 00:00:00.000
Date
18/11/2019
19/11/2019
20/11/2019
21/11/2019
22/11/2019
23/11/2019
24/11/2019
SMOS Sequences
Disable_Cyclic_Function_SEQ
Enable_Cyclic_Function_SEQ
External_Calibration_NIR_Full_OBOP_SE
Int_LO_Phase_Cal_Noise_FULL_EXT_SE
Int_LO_Phase_Cal_Noise_FULL_NotEXT_Q
PMS_Offset_Calibration_Full_SEQ
SBand_Visibility_SEQ
Update_Cyclic_LO_PhCal_NoU_Full_EXT_S
Update_Cyclic_LO_PhCal_NoU_Full_NotEXSEQ
XB_Cmd_Downlink_Sb_SEQ
XB_Cmd_Downlink_Vpa_SEQ

3 TC Failures

None.

4 On Board Anomalies

- MIRAS instrument MM, partition P7, latched up 2019-11-23T14:14:16.618z (DOY 327). The following parameters went out of limits in the PLPC system:

  2019.327.14.14.16.618z DMASME05 LU Switch P7
  2019.327.14.14.16.618z DMASME37 SDD LU Detected

  This anomaly was geolocated over north side of Kazakhstan

  Latitude = 53.78°
  Longitude = 68.44°

  There were no science data losses associated with this anomaly because it affected partition P7, while the Read and Write pointers were both on partitions P1.

  Recovery took place on, 25 NOV 2019, at 19:00:00z (CRF 853). At the time of the anomaly the position of the MM pointers were as follows:

  READ = 690839 (partition P1)
  WRITE = 716512 (partition P1)

- MIRAS instrument MM, partition P4, latched up 2019-11-23T04:10:29.402z (DOY 327). The following parameters went out of limits in the PLPC system:

  2019.327.04.10.29.402z DMASME08 LU Switch P4
  2019.327.04.10.29.402z DMASME37 SDD LU Detected

  This anomaly was geolocated over north-west side of Canada (Yukon region)

  Latitude = 65.24°
  Longitude = 226.43°

  There were no science data losses associated with this anomaly because it affected partition P4, while the Read and Write pointers were both on partitions P7. Recovery took place on, 25 NOV 2019, at 19:00:00z (CRF 853).

  At the time of the anomaly the position of the MM pointers were as follows:

  READ = 3146606 (partition P7)

WRITE = 3182940 (partition P7)

- The MIRAS CMN, unit H3, unlocked 2019-11-21T16:08:20.791z (DOY 325). This anomaly was geolocated over Antarctica:

  Latitude = -73.40°
  Longitude = 358.58°

  Both, CMN locking status, TM SPM13167, and output power, TM SPM13162 went out of limits in the FOS PLPC system. The anomaly recovered in 5 Epochs.

- MIRAS instrument MM, partitions P6+P7+P8 (all in unit FPGA 3), latched up simultaneously during the execution of the CCU recovery at 2019-11-20T08:53:15.985z (DOY 324). The following parameters went out of limits in the PLPC system:

  2019.324.88.53.15,985z DMASME06 LU Switch P6
  2019.324.88.53.15,985z DMASME05 LU Switch P7
  2019.324.88.53.15,985z DMASME04 LU Switch P8

  This type of anomaly did not happen before since the three partitions went at the same time OFF during the execution of the CCU recovery procedure PRO-CRP-100. The three parameters went out of limits immediately after housekeeping packet SID 11 and SID 12 where activated from ground (included as part of procedure PRO-CRP-100, steps 8 and 9). These three HK parameters are all included in packet 3,25 SID 11, this means that the anomaly could happen sometime between the CCU reset and the activation of that HK packet. Because the anomaly was seen during the last SBand pass in working hours of the 20th of November, and to minimize the risk of a potential fourth partition going latch up which certainly stop science data generation, it was decided from FOS side to try to recover the anomaly as soon as possible. For that, FOS requested to CNES an extra pass to upload procedure PRO-CRP-800 *"Mass Memory Latchup Handling"*. This extra pass was granted by CNES, Sband pass, IVK-8 with AOS at 15:48:50z (20 NOV 2019). The recovery procedure was executed at 16:15:00z according to FOS CRF number 852. It was later on, upon reception of S Band pass ASX-24 with AOS at 19:26:37z, that the anomaly appeared to be solved with all the OOL gone on the FOS PLPC system.
  No clear explanation for the anomaly has been found, but discarding a real latch up caused by external radiation, the problem could be due to a progressive degradation of the FPGA units. Similar problem to this was also been seen during the latch-up recovery events 08/08/2019 and on 01/07/2019.

This anomaly was geolocated over the South Atlantic Ocean, half way between the islands of Georgetown and Saint Helena:

Latitude = -12.82°
Longitude = 344.71°

There were no science data losses associated with this anomaly because Read and Write pointers were both on partition P0. At the time of the anomaly the position of the MM pointers were as follows:

READ = 153637 (partition P0)
WRITE = 200237 (partition P0)

- The MIRAS CCU on-board computer, reset on 2019-11-20T02:36:35.472z (DOY 324). The anomaly was initially suspected by the FOS on call Engineer since the X-band Svalbard pass with AOS at 04:12:43z was not received on ground and KSAT operator sent an email notifying the anomaly. Later on, the FOS on call Engineer confirmed the anomaly upon reception on the FOS on call phone of the S-Band pass with AOS at 05:21:17z . Around 07:00 utc, FOS on call Engineer called to the CNES hotline detailing the anomaly. Since the second consecutive X-band pass over Svalbard was also not received on ground (AOS 07:34:33z), the KSAT operator alerted by phone around 07:45, to the FOS on call Engineer.

  The reset happened at the end of Svalbard X band GS pass with AOS at 02:32:39z. Last MIRAS TM packet received before the reset was time stamped at 2019-11-20T02:36:35.472z. As specified in the instrument boot report after the restart of the instrument, the reset was triggered by the standard *"Task Overrun"* error.

  The corresponding replanning for week 47 was prepared by FOS in the morning of the 20 of November, CRF-850, and uplinked by CNES, following the execution of PRO-CRP-100, during S band GS pass KUX-22 (AOS 2019-11-20T08:51:02z). As per this re-planning, nominal MIRAS X band GS dumps will be resumed on 2019-11-20T14:20:13z (Svalbard).

  Because of this reset, around 210 seconds of science data will be lost from 2019-11-20 02:36:35 to 2019-11-20 02:40:05 also the following X band GS passes were not acquired:

Station	AOS	LOS	Duration
SVAL	2019-11-20T02:32:39	2019-11-20T02:43:06	626
SVAL	2019-11-20T04:12:43	2019-11-20T04:22:23	580
ESAC	2019-11-20T05:42:56	2019-11-20T05:51:14	497
SVAL	2019-11-20T07:34:33	2019-11-20T07:41:38	425

SVAL	2019-11-20T09:16:58	2019-11-20T09:21:43	284
SVAL	2019-11-20T10:59:12	2019-11-20T11:02:41	209
SVAL	2019-11-20T12:40:09	2019-11-20T12:44:57	288

The sequence of events leading to the CCU reset was as follows:

Generation Time	Reception Time	EvID	Severity	Messsage Text
2019.324.02.32.58.609	2019.324.05.54.30.335	725	NORM	XBand Powered On
2019.324.02.33.22.599	2019.324.05.54.31.587	695	NORM	MM Full Dump Start
2019.324.02.35.11.571	2019.324.05.54.36.826	33233	NORM	LO Cal NoUN FULL NoEXT OBOP 29 Started
2019.324.02.35.15.221	2019.324.05.54.37.167	826	NORM	Mode Change To Full Polarisation
2019.324.02.35.16.411	2019.324.05.54.37.167	826	NORM	Mode Change To Full Polarisation
2019.324.02.35.17.571	2019.324.05.54.37.281	33234	NORM	LO Cal NoUN FULL NoEXT OBOP 29 Completed
2019.324.02.36.34.602	2019.324.05.54.41.038	689	ALARM	MM_Error_Counters_Acquisition_Failure
2019.324.02.36.34.622	2019.324.05.54.41.038	690	ALARM	MM_Scrub_Frequency_Acquisition_Failure
2019.324.02.36.34.662	2019.324.05.54.41.038	684	ALARM	MM_Address_Acquistion_Failure
2019.324.02.36.34.662	2019.324.05.54.41.038	682	NORM	MM Dump Ended
2019.324.02.36.34.712	2019.324.05.54.41.039	692	ALARM	MM_Science_Write_Failure
2019.324.02.36.34.812	2019.324.05.54.41.039	692	ALARM	MM_Science_Write_Failure
2019.324.02.36.34.912	2019.324.05.54.41.039	692	ALARM	MM_Science_Write_Failure

and after this last event the instrument reset just at the end of the X-Band pass. The values of the READ and WRITE pointers at the time of the reset were:

Read = 735636, MM Partition P1
Write = 995706, MM Partition P2

The anomaly was geolocated over Artic Ocean at the following geographical coordinates:

Latitude = 74.80°
Longitude = 18.15°

5 On Board Events Telemetry

The following alarm packets were received on the FOS PLPC system at the time of the CCU reset occurrence.

Event Description	Packet ID	Severity	Event Time
MM_Error_Counters_Acquisition_Failure	689	ALARM	2019-11-20T02:36:34
MM_Scrub_Frequency_Acquisition_Failure	690	ALARM	2019-11-20T02:36:34
MM_Address_Acquistion_Failure	684	ALARM	2019-11-20T02:36:34
MM_Science_Write_Failure	692	ALARM	2019-11-20T02:36:34
MM_Science_Write_Failure	692	ALARM	2019-11-20T02:36:34
MM_Science_Write_Failure	692	ALARM	2019-11-20T02:36:34

The following RAM Single Bit errors befell this week:

Event Description	Packet ID	Severity	Event Time	Parameters
RAM single Bit Error	730	WARN	2019-11-20T02:37:09	20DF2F8
RAM single Bit Error	730	WARN	2019-11-19T20:00:00	20DF2F8

6 FOS Systems Status

The FOS TM injector used to transfer and store telemetry data from PLPC control system to SMTA TM archive machine, was ported to version *Java* 8. A successful test of this new version was performed on the 21st of November and as result of that the new version released for operations.

7 Data Reception from CNES

All *S* band passes were correctly received from CNES and successfully processed by the FOS PLPC system.

8 *X* Band Data Reception in PXMF

None, all *S* band passes successfully received and processed.

9 Exceptional Activities

None.

10 AOB

None.

APPENDIX A: OOLs

The following two PLPC out of limits were generated at the time of the second MM latch up of partition P7 that occurred on the 23rd of November.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-23T15:15:51	2019-11-23T14:14:16	DMASME37	SDD LU Detected	FALSE	TRUE
2019-11-23T15:15:51	2019-11-23T14:14:16	DMASME05	LU Switch P7	OFF	ON

On the 23rd of November, the following two PLPC out of limits, highlighted the MM latch-up of partition P4.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-23T05:41:54	2019-11-23T04:10:29	DMASME37	SDD LU Detected	FALSE	TRUE
2019-11-23T05:41:54	2019-11-23T04:10:29	DMASME08	LU Switch P4	OFF	ON

The H3 CMN unlock on the 21st of November, generated the following two temporary out of limits on the FOS PLPC system.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-21T19:20:01	2019-11-21T16:08:20	SPM13167	H3 LO_Locking	UNLOCK	LOCK
2019-11-21T19:20:01	2019-11-21T16:08:20	SPM13162	H3 LO_Out_Power	NOT-OK	OK

As detailed in section 4 of this report, during the execution of the CCU recovery procedure, three MM partitions belonging to the same FPGA-3 unit, went unexpectedly off and their corresponding three out of limits issued by the FOS PLPC system.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-20T13:43:32	2019-11-20T08:53:15	DMASME06	LU Switch P6	OFF	ON
2019-11-20T13:43:32	2019-11-20T08:53:15	DMASME05	LU Switch P7	OFF	ON
2019-11-20T13:43:32	2019-11-20T08:53:15	DMASME04	LU Switch P8	OFF	ON

During the execution of the CCU recovery procedure, the following expected OOL was issued by the PLPC system. indicating that the on-board ITL was made temporary disabled.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-20T13:43:32	2019-11-20T08:53:15	NTLHK022	ITL Ena State	Disabled	Enabled

The following list of out of limits were issued by the FOS PLPC system at the time of the CCU reset on the 20th of November.

GS_TIME	OB_TIME	PARAMETER	DESCRIPTION	OOL Value	Check Value
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM22167	C3 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM21167	C2 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM20167	C1 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM19167	B3 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM18167	B2 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM17167	B1 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM16167	A3 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM15167	A2 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM14167	A1 LO_Locking	UNLOCK	LOCK

2019-11-20T05:54:42	2019-11-20T02:37:08	SPM13167	H3 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM12172	H2 LO_locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPM11167	H1 LO_Locking	UNLOCK	LOCK
2019-11-20T05:54:42	2019-11-20T02:37:08	SPC02106	Instrument_Mode	Inst Init	Any mode
2019-11-20T05:54:42	2019-11-20T02:37:08	XNIRABST	NIR AB VALID ST	NOT-OK	OK
2019-11-20T05:54:42	2019-11-20T02:37:08	XNIRBCST	NIR BC VALID ST	NOT-OK	OK
2019-11-20T05:54:42	2019-11-20T02:37:08	XNIRCAST	NIR CA VALID ST	NOT-OK	OK