1 General Comments

Activities scheduled for this week are those planned for the 36th calendar week of 2015, 31 AUG 2015 to 07 SEP 2015 (DoYs 243 to 250).

The following routine activities were planned this week (see Gantt chart on next page and CRF 518):

- One Warm NIR Calibration on 02 SEP 2015 (DoY 245) with ETO 17:50:30z (orbit 30658) and with the following expected calibration values (*this calibration was cancelled due to an unexpected Collision Avoidance Manoeuvre on 2015-09-01, see section 2 of this report for further details*)

  B.T. = 3.8060
  R.M.S. = 0.3595
  Sun Elevation = 0.4418 degrees
  R.A. = 78.0284 degrees
  DEC. = -37.8757 degrees
- One PMS Offset on 03 SEP 2015 (DoY 246), including three Short Calibrations at 15:15:30.0z, 15:04:35.2z, and 15:05:10.0z (orbit 30671).
- Local Oscillator Calibrations every 10 minutes.
- *X* band Passes over ESAC and Svalbard.

2 Mission Planning Deviations

- MIRAS suffered a CCU Reset on 2015-08-31T16:25:19.552z. A re-planning for week 36 (CRF 519) was uploaded on 2015-09-01T10:15:15z (GS Pass KUX-01). As consequence of this reset the following *X* Band Passes were lost:

Station	Start Pass	End Pass	Duration
Xband_ESAC	2015-08-31T19:53:55.088000	2015-08-31T19:58:47.046000	291
Xband_SVAL	2015-08-31T21:20:21.110000	2015-08-31T21:30:41.573000	620
Xband_SVAL	2015-08-31T22:59:05.534000	2015-08-31T23:09:21.233000	615
Xband_SVAL	2015-09-01T00:37:45.525000	2015-09-01T00:48:07.028000	621
Xband_SVAL	2015-09-01T02:16:40.378000	2015-09-01T02:27:07.574000	627
Xband_SVAL	2015-09-01T03:56:13.837000	2015-09-01T04:06:23.420000	609
Xband_ESAC	2015-09-01T05:27:06.797000	2015-09-01T05:35:16.161000	489
Xband_ESAC	2015-09-01T07:08:44.527000	2015-09-01T07:12:12.031000	207
Xband_SVAL	2015-09-01T09:00:30.101000	2015-09-01T09:05:34.870000	304
Xband_SVAL	2015-09-01T10:42:51.353000	2015-09-01T10:46:22.154000	210

- Nominal *X* Band Passes were resumed from 2015-09-01T12:24:00z onwards.

- SMOS executed a CAM on 2015-09-01T23:19:00z. As consequence of this manoeuvre, the warm NIR Calibration scheduled on 2015-09-02T17:50:30z (i.e. within the 24 h period immediately following the CAM) had to be cancelled. For that purpose the MIRAS ITL was disabled via CRF 520 at an incorrect time, from 2015-09-02T13:09z instead of 2015-09-02T17:09z. The error was emended via CRF 522. As consequence of this mishap the following *X* Band Passes were lost although no data loss did take place due to this error.

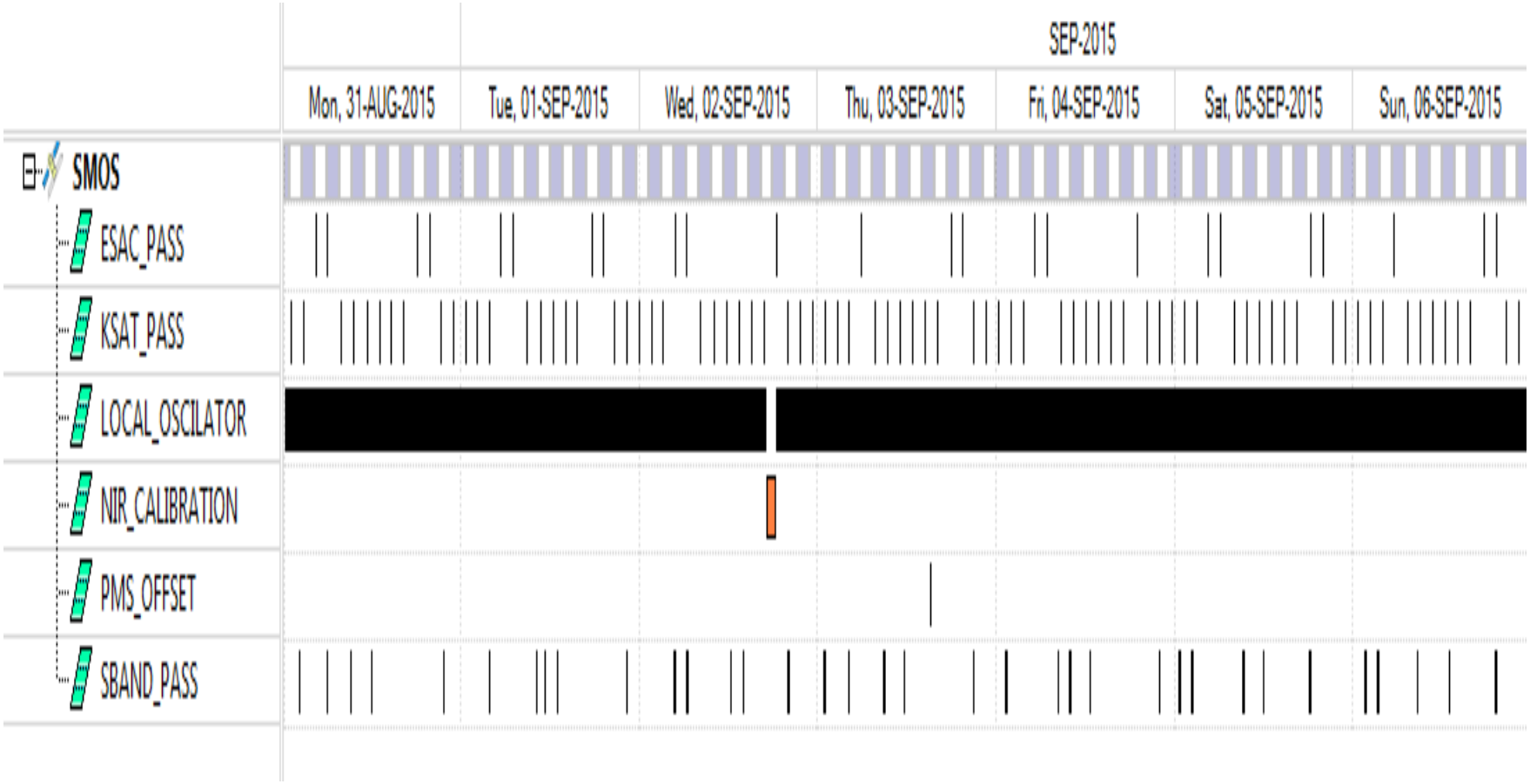
Station	Start Pass	End Pass	Duration
Xband_SVAL	2015-09-02T13:25:13.557000	2015-09-02T13:31:06.433000	352
Xband_SVAL	2015-09-02T15:05:06.255000	2015-09-02T15:13:13.092000	486

- Nominal *X* Band Passes resumed 2015-09-02T16:00:00z onwards.

- MIRAS suffered another CCU Reset on 2015-09-04T02:03:23z. A re-planning for week 36 (CRF 523) was uploaded on 2015-09-04T09:58:08z (GS Pass KUX-04). As consequence of this reset the following *X* Band Passes were lost:

Station	Start Pass	End Pass	Duration
Xband_SVAL	2015-09-04T03:39:26.979000	2015-09-04T03:49:43.141000	616
Xband_ESAC	2015-09-04T06:50:53.168000	2015-09-04T06:56:32.823000	339
Xband_SVAL	2015-09-04T08:43:17.664000	2015-09-04T08:48:45.964000	328
Xband_SVAL	2015-09-04T10:25:44.660000	2015-09-04T10:29:22.104000	217
Xband_SVAL	2015-09-04T12:07:06.890000	2015-09-04T12:11:16.793000	249

- Nominal *X* Band Passes were resumed from 2015-09-04T13:47:22z onwards.


SEP-2015
Mon, 31-AUG-2015
Tue, 01-SEP-2015
Wed, 02-SEP-2015
Thu, 03-SEP-2015
Fri, 04-SEP-2015
Sat, 05-SEP-2015
Sun, 06-SEP-2015
SMOS
ESAC_PASS
KSAT_PASS
LOCAL_OSCILATOR
NIR_CALIBRATION
PMS_OFFSET
SBAND_PASS

3 TC Failures

None.

4 Unforeseen Out of Limits (OOLs)

Several MIRAS out of limits were received on PLPC system related with the two CCU reset anomalies and their recovery. Also two OOLs were received at the time of the CAM execution and the disable of the NIR calibration commands. Further details can be found in Appendix-A of this report.

5 On Board Anomalies

- MIRAS suffered a CCU Reset on 2015-09-04T02:03:23z.

First indications of a possible CCU reset were initially triggered by KSAT team due to acquisition problems of the following XBand passes:

2015-09-04T02:00:02z 2015-09-04T02:10:29z (Svalbard)
2015-09-04T03:39:26z 2015-09-04T03:49:43z (Svalbard)
2015-09-04T05:10:48z 2015-09-04T05:18:32z (ESAC)
2015-09-04T06:50:53z 2015-09-04T06:56:32z (ESAC)

For the first pass above, only few packets were received on ground since the reset happened 201 seconds after the start of the pass. The second pass was not received since the reset already took place in the pass before and the instrument was at that time in auto-downlink mode over ESAC. Following this last pass, all the XBand passes over Svalbard did also fail.

The reset befell during the 02:03:23z Svalbard X Band Pass. Said pass was scheduled for duration of 607 s. The reset occurred 201s after AoS, and before the switch off of the X Band Antenna, scheduled for 02:11:20z. The first MIRAS HK TM Packet after the reset was issued at 02:03:56.501z. CNES executed the CCU Recovery Procedure starting on 2015-09-04T09:58:08z during GS Pass KUX-4. Re-planning was issued by FOS on 2015-09-04 via CRF No. 523 and uploaded by CNES starting on 2015-09-04T09:58:08z, during GS Pass KUX-4.

The sequence of events prior to the CCU was:

2015-09-04T02:01:13.047 = X Band Transmitter on
2015-09-04T02:01:37.047 = Start of MM data
2015-09-04T02:03:22.638= MM_Error_Counters_Acquis_Failure
2015-09-04T02:03:22.658=MM_Scrub_Frequency_Acquis_Failure
2015-09-04T02:03:22.698 = MM_Address_Acquis_Failure
2015-09-04T02:03:22.698 = MM Dump Ended

2015-09-04T02:03:22.958 = MM_Science_Write_Failure

As shown above, several Event Alarm packets were received before the reset indicating that accessing and writing the MIRAS Mass Memory was not possible. The symptoms of this reset were very similar to the ones received on the reset of 2015-04-28 and 2015-08-31 but different than the ones that happened just before, on 2015-06-30, 2015-08-19 and on 2015-08-22, where no previous error packets were issued by the instrument.

The values of the READ and WRITE pointers at the time of the reset were:

Read = 122827, MM Partition P0
Write = 378960, MM Partition P0

The geolocation of the event was over Artic Regions:

LAT. = 72.5539
LONG. = 31.1283

- MIRAS suffered another CCU Reset on 2015-08-31T16:25:19.552z.

First indications of a possible CCU reset were initially triggered by DPGS team due to acquisition problems of the following XBand passes:

2015-08-31T16:22:40z 2015-08-31T16:32:03z (Svalbard)
2015-08-31T18:14:03z 2015-08-31T18:21:59z (ESAC)
2015-08-31T19:53:55z 2015-08-31T19:58:47z (ESAC)

For the first two passes above, just few Science packets were acquired on ground while no data was received for the third one. Following this last pass, all the Xband passes over Svalbard did also fail.

KSAT was contacted by the FOS oncall Engineer on the 31st of August at 22:39z confirming no Xband data reception at ground station level. A new Sband pass took place on 2015-08-31T21:41z but after reception of that pass no phone call from the CNES Hot line was received. In order to confirm the possible CCU reset, the FOS oncall Engineer called twice the CNES Hot Line with no response. The CCU reset was finally and remotely confirmed by the FOS oncall Engineer using the periodic housekeeping reports received on his mobile phone. CNES finally called and confirm the reset on 1st of September at 5:11z.

The reset befell during the 16:22:40.721z Svalbard *X* Band Pass. Said pass was scheduled for a duration of 542 s. The reset occurred 88.1 s after AoS, and before the switch off of the *X* Band Antenna, scheduled for 16:32:53.780z. Data download had terminated at 16:24:45.279z. The first MIRAS HK TM Packet after the reset was issued at

16:25:19.522z. CNES executed the CCU Recovery Procedure starting on 2015-09-01T10:15:15z during GS Pass KUX-1. Re-planning was issued by FOS on 2015-09-01 via CRF No. 519 and uploaded by CNES starting on 2015-09-01T10:15:15z, during GS Pass KUX-01.

The sequence of events prior to the CCU was:

- 2015-08-31T16:23:51.609 = *X Band Transmitter on*
- 2015-08-31T16:24:15.609 = *Start of MM data*
- 2015-08-31T16:24:45.609 = MM_Error_Counters_Acquis_Failure
- 2015-08-31T16:24:45.609 = MM_Scrub_Frequency_Acquis_Failure
- 2015-08-31T16:24:45.609 = MM_Address_Acquis_Failure
- 2015-08-31T16:24:45.609 = MM Dump Ended
- 2015-08-31T16:24:45.919 = MM_Science_Write_Failure

As it is possible to see several Event Alarm packets were received before the reset indicating that accessing and writing the MIRAS Mass Memory was not possible. The symptoms of this reset were very similar to the ones received on the reset of 2015-04-28 but different than the ones that happened just before, on 2015-06-30, 2015-08-19 and on 2015-08-22, where no previous error packets were issued by the instrument.

Immediately following the *Start of MM data* Event the CCU Reset befell and a Boot Report Packet was issued by the instrument with the following cause for the SW Reset: SLOT_SCH_TASK_OVERRUN (identical to all previous resets).

The values of the READ and WRITE pointers at the time of the reset were:

- Read = 711362, MM Partition P1
- Write = 456356, MM Partition P1

The geolocation of the event was over Artic Regions:

- LAT. = 80.369814
- LONG. = 84.171973

- At the time of the CCU-reset recovery. At 2015-09-01T 10:18:42z, a double bit memory error was temporary detected in partition P3.. The following parameters went Out of Limit at that time:
  DMASME42 “DB Err in P3” with value FALSE
  NMASME08 “Last IP SB Errs” with value 1
  NMASME09 “Last IP DB Errs” with value 2
  NMASME13 “SB Err Cnt P3” with value 1

6 On Board Events Telemetry

The following Event Alarm Packets were received just before the CCU reset on 2015-09-04T02:03:23z:

Event Description	Severity	Event Time	Parameters
MM_Error_Counters_Acquis_Failure	ALARM	2015.247.02.03.22.638	No Response
MM_Scrub_Frequency_Acquis_Failure	ALARM	2015.247.02.03.22.638	No Response
MM_Address_Acquis_Failure	ALARM	2015.247.02.03.22.638	No Response
MM_Science_Write_Failure	ALARM	2015.247.02.03.22.638	Link Problem

The following Event Alarm Packets were received just before the CCU reset on 2015-08-31T16:25:19.552z

Event Description	Severity	Event Time	Parameters
MM_Error_Counters_Acquis_Failure	ALARM	2015.243.16.24.45.609	No Response
MM_Scrub_Frequency_Acquis_Failure	ALARM	2015.243.16.24.45.609	No Response
MM_Address_Acquis_Failure	ALARM	2015.243.16:24.45.609	No Response
MM_Science_Write_Failure	ALARM	2015.243.16:24.45.919	Link Problem

The following RAM Single Bit Errors befell this week:

Event Description	Severity	Event Time	Parameters
RAM Single Bit Error	WARN	2015.243.16.25.20.052	2342768

7 FOS Systems Status

All FOS Systems behaved nominal during this week.

8 Data Reception from CNES

All *S* Band Passes were correctly received from CNES and successfully processed by the FOS PLPC System, with the following exceptions:

9 *X* Band Data Reception in PXMF

None, all *S* Band Passes successfully received and processed.

10 Exceptional Activities

- On 2015-09-01 a SMOS collision avoidance manoeuvre was performed. The MIRAS onboard timeline was disabled and the science instrument data flagged as "External data" during the whole duration of the manoeuvre, about 33 minutes, from the 2015-09-01T23:19z to 2015-09-01T23:52z. The commands for that special manoeuvre were uploaded around 14:33z. No X-Band passes were lost since the manoeuvre was executed between two Svalbard passes. The execution result of this manoeuvre was:
  Commanded Da= -90m,
  Observed Da=-86,6m

Efficiency=96,12%.

- Due to the impossibility to perform two consecutive External manoeuvres in less than 24 hours, the NIR Calibration initially scheduled at 2015-09-02T17:50:30z, was cancelled. During the time initially allocated for that calibration, from 2015-09-02T17:09:00z to 2015-09-02T18:33:00z, the instrument was working nominally at its correct attitude pointing and nominal configuration.
  NIR Calibration commands were not executed on board because MIRAS ITL was made disabled between 2015-09-02T17:09:00z to 2015-09-02T18:33:00z (CRF-520 and execution of FOP procedures PRO-FCP-53 and PRO-FCP-52).
  Unfortunately due to an error on CRF-520, MIRAS ITL was made disabled at 2015-09-02T13:09z instead of 2015-09-02T17:09z. The error was emended via CRF 522. As consequence of this mishap two *X* Band Passes were lost. (see section 2 for further details)

11 AOB

None.

APPENDIX A: OOLs

The list of Out of Limits included here below in Table-1, corresponds to the MIRAS CCU reset that happened on 2015-09-04T02:03:23z. The first OOL in this table reflects the moment when the MIRAS ITL was disabled at the time of the instrument CCU recover procedure.

GS_TIME	OBTIME	PARAMETER	DESCRIPTION
2015.247.10.29.32.822	2015.247.10.00.38.860	NTLHK022	ITL Ena State
2015.247.08.51.58.822	2015.247.02.03.56.581	XNIRCAST	NIR CA VALID ST
2015.247.08.51.58.822	2015.247.02.03.56.581	XNIRBCST	NIR BC VALID ST
2015.247.08.51.58.822	2015.247.02.03.56.581	XNIRABST	NIR AB VALID ST
2015.247.08.51.58.819	2015.247.02.03.56.581	SPC02106	Instrument_Mode
2015.247.08.51.58.818	2015.247.02.03.56.581	SPM14167	A1 LO_Locking
2015.247.08.51.58.818	2015.247.02.03.56.581	SPM13167	H3 LO_Locking
2015.247.08.51.58.818	2015.247.02.03.56.581	SPM12172	H2 LO_locking
2015.247.08.51.58.818	2015.247.02.03.56.581	SPM11167	H1 LO_Locking
2015.247.08.51.58.817	2015.247.02.03.56.581	SPM19167	B3 LO_Locking
2015.247.08.51.58.817	2015.247.02.03.56.581	SPM18167	B2 LO_Locking
2015.247.08.51.58.817	2015.247.02.03.56.581	SPM17167	B1 LO_Locking
2015.247.08.51.58.817	2015.247.02.03.56.581	SPM16167	A3 LO_Locking
2015.247.08.51.58.817	2015.247.02.03.56.581	SPM15167	A2 LO_Locking
2015.247.08.51.58.816	2015.247.02.03.56.581	SPM22167	C3 LO_Locking

2015.247.08.51.58.816	2015.247.02.03.56.581	SPM21167	C2 LO_Locking
2015.247.08.51.58.816	2015.247.02.03.56.581	SPM20167	C1 LO_Locking

Table-1

The list of Out of Limits included here below in Table-2, corresponds to the MIRAS CCU reset that happened on 2015-08-31T16:25:19.552z. The first OOL in this table reflects the moment when the MIRAS ITL was disabled at the time of the instrument CCU recover procedure.

GS_TIME	OBTIME	PARAMETER	DESCRIPTION
2015.244.10.52.32.201	2015.244.10.17.40.566	NTLHK022	ITL Ena State
2015.243.22.22.07.129	2015.243.16.25.19.552	XNIRCAST	NIR CA VALID ST
2015.243.22.22.07.129	2015.243.16.25.19.552	XNIRBCST	NIR BC VALID ST
2015.243.22.22.07.129	2015.243.16.25.19.552	XNIRABST	NIR AB VALID ST
2015.243.22.22.07.125	2015.243.16.25.19.552	SPM11167	H1 LO_Locking
2015.243.22.22.07.125	2015.243.16.25.19.552	SPC02106	Instrument_Mode
2015.243.22.22.07.124	2015.243.16.25.19.552	SPM14167	A1 LO_Locking
2015.243.22.22.07.124	2015.243.16.25.19.552	SPM13167	H3 LO_Locking
2015.243.22.22.07.124	2015.243.16.25.19.552	SPM12172	H2 LO_locking
2015.243.22.22.07.123	2015.243.16.25.19.552	SPM17167	B1 LO_Locking
2015.243.22.22.07.123	2015.243.16.25.19.552	SPM16167	A3 LO_Locking
2015.243.22.22.07.123	2015.243.16.25.19.552	SPM15167	A2 LO_Locking
2015.243.22.22.07.122	2015.243.16.25.19.552	SPM20167	C1 LO_Locking

2015.243.22.22.07.122	2015.243.16.25.19.552	SPM19167	B3 LO_Locking
2015.243.22.22.07.122	2015.243.16.25.19.552	SPM18167	B2 LO_Locking
2015.243.22.22.07.121	2015.243.16.25.19.552	SPM21167	C2 LO_Locking
2015.243.22.22.07.110	2015.243.16.25.19.552	SPM22167	C3 LO_Locking

Table 2

At the time of the Collision Avoidance Manoeuvre, and when the MIRAS ITL was disabled the following OOL was received on the PLPC system

GS_TIME	OBTTIME	PARAMETER	DESCRIPTION
2015.245.05.18.38.783	2015.244.23.19.55.396	NTLHK022	ITL Ena State

Table 3

At the time of the execution of CRF-520 and CRF-522, the MIRAS ITL was made disabled twice and the following OOL received on PLPC system:

GS_TIME	OBTTIME	PARAMETER	DESCRIPTION
2015.245.20.38.24.370	2015.245.17.09.02.007	NTLHK022	ITL Ena State
2015.245.14.32.34.060	2015.245.13.09.01.872	NTLHK022	ITL Ena State

Table-4