CENTRE NATIONAL D'ÉTUDES SPATIALES

Status of IASI FM2 on METOP-A

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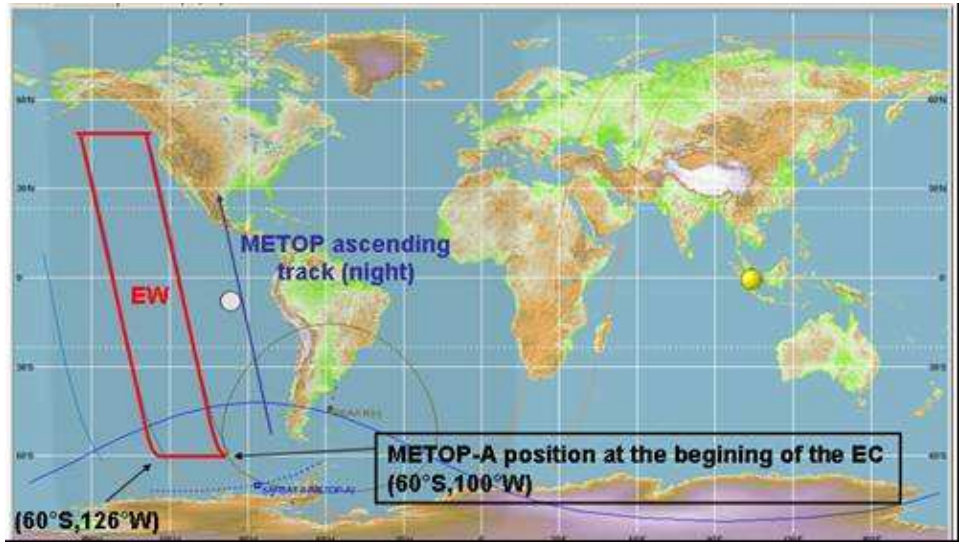
Introduction

- This presentation is based on a common CNES/EUMETSAT work which is done on a bi-annual basis.
- This is reflected in a document, which was presented for the CNES IASI Annual Performance Review (REVEX) in September 2008 at CNES, updated in April 2009 for the September 2008- February 2009 period (available on CNES and EUM web sites)
- The results presented here cover the period from the last ASSFTS13 workshop (Nov. 2007) up to end of February 2009 (16 months).

IASI FM2 main events during the period

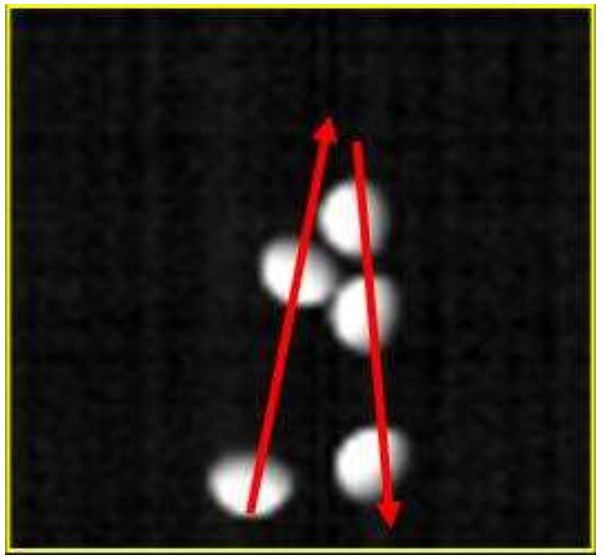
Monthly calibrations

A regular monthly external calibration is performed every 29 days (412 orbits) over the same part of the Earth for data comparability reasons. 16 events caused a total of roughly 63 hours of mission outage.



Moon avoidance

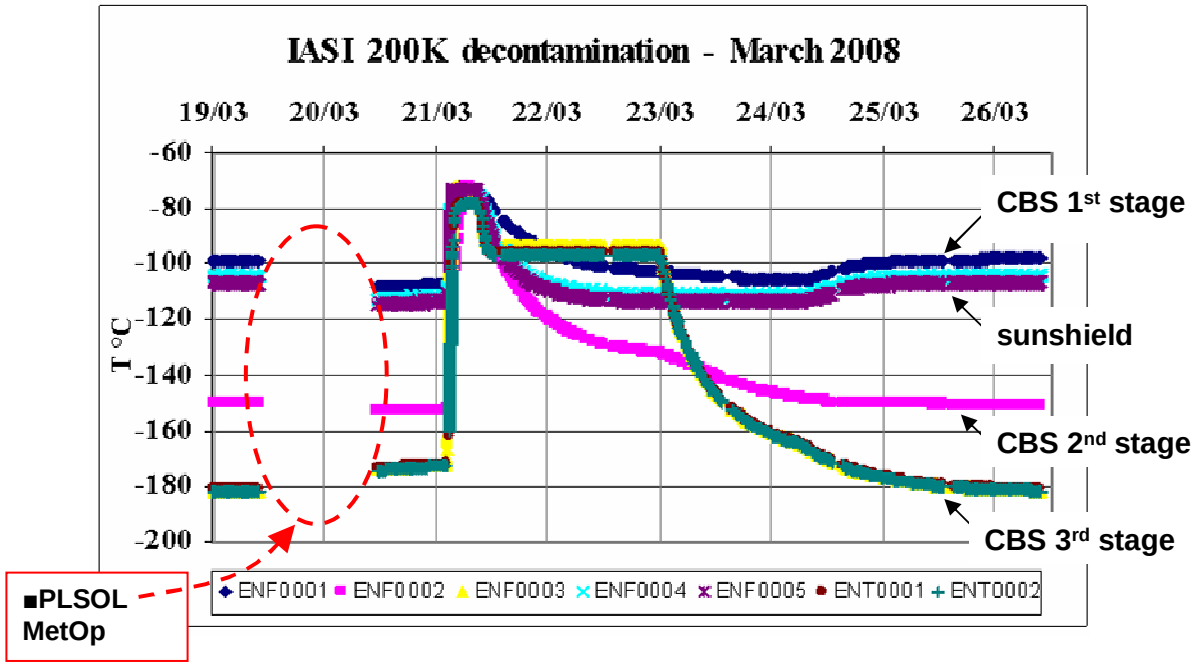
Occasionally a request for an additional external calibration is necessary when the moon is expected to enter in the IASI field-of-view. The typical duration of this activity is between 15 and 24 hours. During the period, there was 4 events for a total mission outage of a little bit more than 4 days. An optimized sequence of operation for moon avoidance events is under study with EUM to reduce drastically the outage.



IASI FM2 main events during the period (cont.)

■ Decontamination

The decontamination lines heat the different parts of the Cold Box Subsystem (the three passive radiator stages and the sunshield) up to a temperature of 200 K (-73°C) for a duration of 4 hours. Then during the cooling down of the first and second stages, the third stage is maintained at -93°C in order to avoid re-deposition of ice on the cold optics. About 1.5 day later, when the second stage reaches -131°C, the third stage decontamination line can be switched off and the cooling of the first stage begins. It takes about 4 days to cool down the CBS third stage from -73°C to -181.8°C, the final temperature being exactly the same as before the outgassing phase.



■Performed during PL-SOL recovery, on the 21st of March 2008, leading to a mission outage of less than 5 days.

IASI FM2 main events during the period (cont.)

On-board processing configuration updates

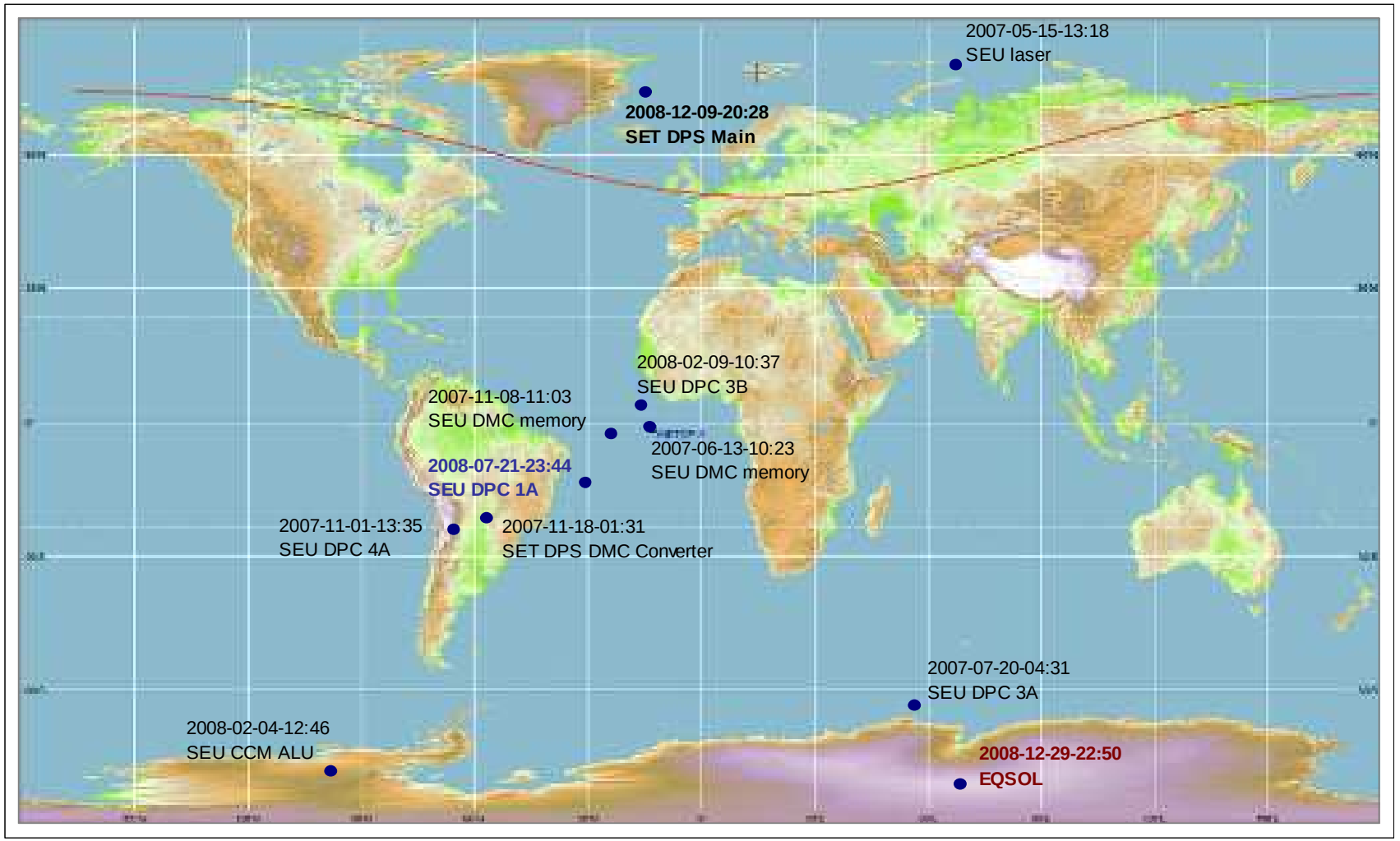
- 2008-03-03 Reduced spectra update mission outage: 00:16:35
- 2009-02-24 Reduced spectra update mission outage: 00:32:58

SEU (Single Event Upset)

The effect of SEU (heater refuse) leads to small mission outage, thanks to the turbo procedure developped end of 2007. An update of on-board software will soon decrease again this mission outage from 3 hours/anomaly to less than 5 min.

Date	Event	Description	Class	Mission Outage
21/07/2008	Heater Refuse	SEU in DPS subsystem (DPC Pixel-1 Suspend)	SEU	0 days 03:03:22
09/12/2008	Standby Refuse	SET in the main converter (CV1) supplying DPCs and FMU	SET	2 days 15:22:55
29/12/2008	IASI EQSOL /Suspend	SEU of high energy particles impacting the IMS SRAM and generating a waterfall effect of lower energy radiations	SEU	2 days 16:20:10
from launch to 10/31/07: 3 heater refuse (SEU)				3 days 14:26:42
from 11/01/07 to 02/28/09: 5 heater refuse (SEU), 2 STBY refuse (SET), 1 EQSOL (SEU)				**10 days 18:11:36**

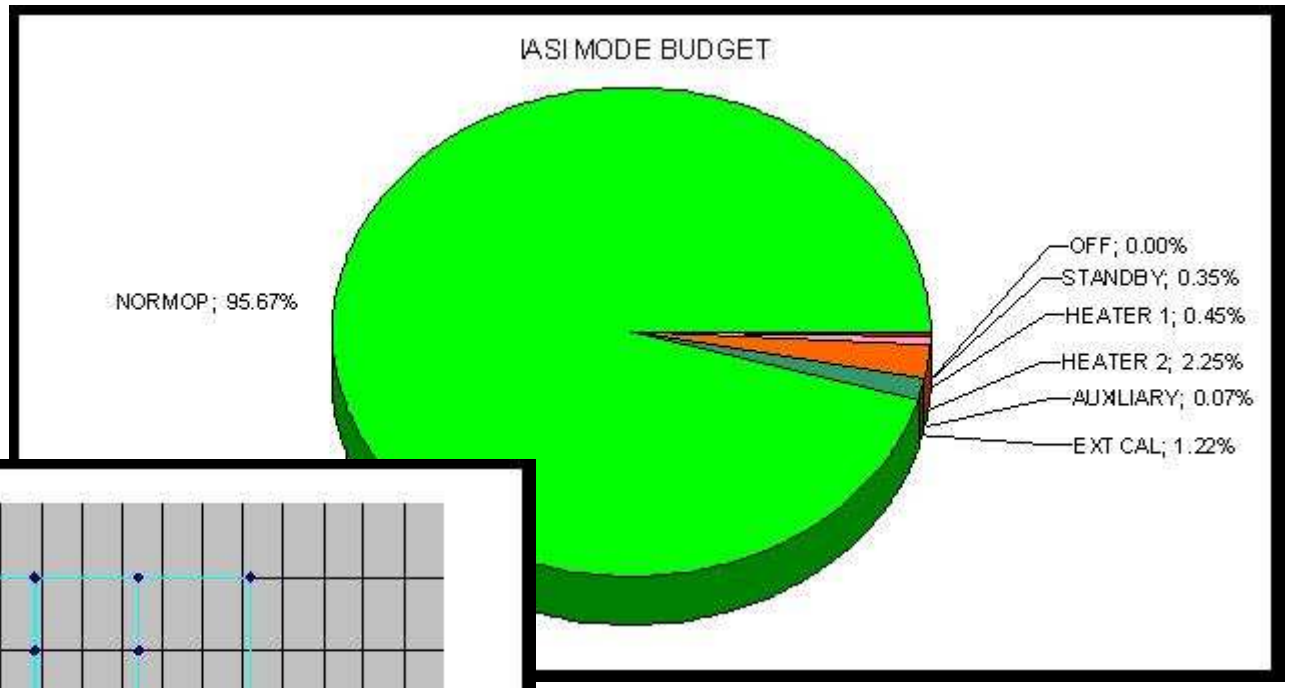
geo-located plot of IASI SEU/SET anomalies

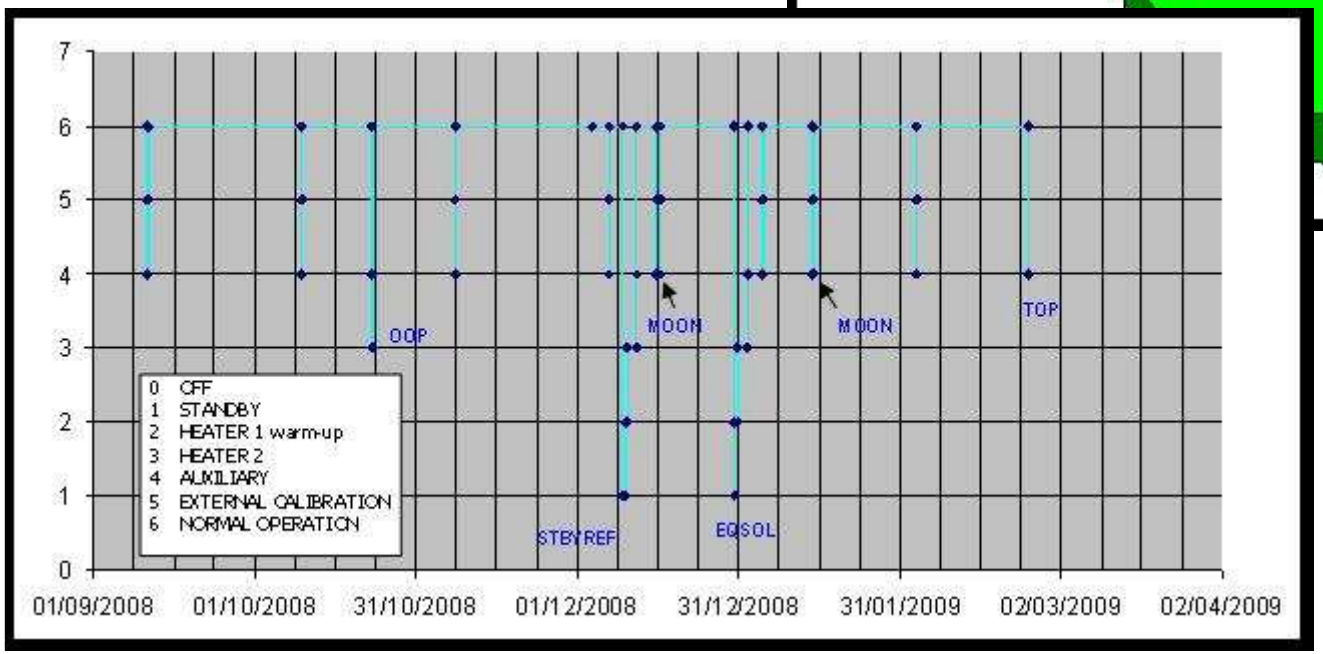


SW update

- The SW was successfully tested: makes an automatic reset of DPS when DPS is suspended (SEU)
- It will be uploaded before summer holidays
- An in-orbit verification will be observed before the EEPROM programming on the 2 others models on-ground
- This update will cure only SEU leading to heater refuse… Any anomaly leading to STBY refuse has at least 2 days and 14 hours of mission outage, due to the temperature behavior (passive cooling down)

IASI mode budget





FM2 health check

- ***Temperature and power of the instrument are very stable. They are daily monitored by EUMETSAT, weekly, monthly and annually reported for long term trend.***

- ***No special degradation on the instrument to be reported until now.***

- ***Very stable routine performances are achieved (see V. Lonjou slides)***

Conclusion

- IASI FM2 still in very good health at the mid-term of its expected life duration (5 years from the launch)
- It is fully operational
- The instrument configuration is still the nominal one
- The outage is minimised, and actions are taken to minimise it further more
- Performances are guaranteed by CNES Technical Expertise Centres and EUMETSAT…

IASI data are fully available for weather centres and scientists

Overview of heath check of IASI on METOP-B and C

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Introduction

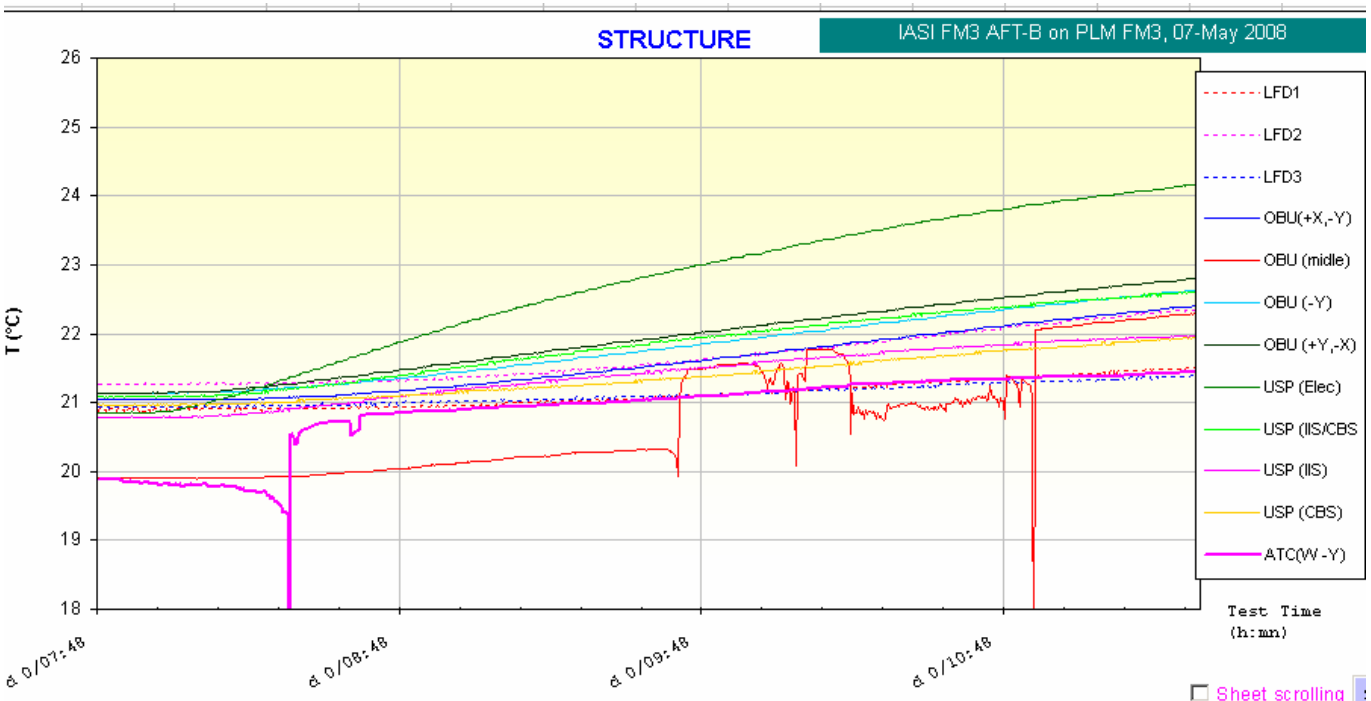
- Every year, a IASI health check is performed at Astrium, in Friedrischaffen, where MetOp-B and MetOp-C are in a clean room storage.

- Since the last meeting, the health check was performed in February 2008 and 2009 for PFM-R and in May 2008 for FM3 (should be done in October 2009, depending on next AIT schedule).

- AFT (Abbreviated Functional Test) : IASI instrument is not in operational mode, the CCM (Cube Corner Mechanism) is locked.

FM3

- **Erratic behavior of 2 thermistors on the redundant part discovered in May 2008:**



°C)	21.5	22.3	21.40	22.41	22.31	22.6	22.8	24.2	22.6	22.0	21.9	21.4
T/dt(K/hr)	0.81	0.00	0.00	0.44	0.44	0.44	0.44	0.47	0.00	0.73	0.73	0.44
in (°C)	20.9	21.3	20.91	21.04	16.31	21.1	21.1	20.8	21.1	20.8	21.0	15.7
ax (°C)	21.5	22.4	21.40	22.41	22.31	22.6	22.8	24.2	22.6	22.0	21.9	21.4
oy(°C)	21.5	22.3	21.40	22.41	22.31	22.6	22.8	24.2	22.6	22.0	21.9	21.4

- **The first one is used for thermal regulation of instrument structure (ENT0030, -Y wall, active), the second one is a monitoring sensor of the optical bench (ENU0002, OBU middle, passive).**

Fenwall thermistors Anomalies on FM3

- These 2 thermistors are Fenwall 526-31-BS012-153 Variant 32. They are concerned by the alert raised on Fenwall thermistors.
- The –Y wall thermistor, which is easily accessible, could be replaced.
- The OBU thermistor is inaccessible without dismounting the instrument and will not be probably changed. As it is not the only point of measure for the optical bench, this is not considered mandatory.
- We recall that on nominal part, an other thermistor is concerned by this alert (RAU) and will not be changed neither.

FM3

- A “tiger team” was set-up to recommend actions following “fenwall anomalies” discovered on FM3 model. It should give its conclusion by the end of may for PFM-R and FM3.

- It is expected to change no more than 1 or 2 thermistors on FM3, without major impact on the instrument. Nothing, as preventive action) on PFM-R.

- Some on-board monitoring will be updated in the next SW release (PFM-R and FM3), to take into account a possible failure on identified thermistors.

PFM-R

- No anomaly was found during the annual health check, in particular the “fenwall anomaly” was not discovered on this model
- Next test for PFM-R: before, during and after the TV test in March 2010
- The IASI PFM-R will be stored in its storage container after the TV test, waiting the reassembly before launch.
- The TV test preparation is on-going. A very good estimate of the instrument performance should be obtained during this test.

Conclusion

- **IASI PFM-R in good functional health.**
  This is the next instrument to be launched, in April 2012. Next steps until the launch for the instrument:
  - **Software update (automatic reset as for FM2, on-board monitoring update, put the SW at the same level as the in-flight one)**
  - **TV test in March/April 2010**
  - **Storage period.**

- **IASI FM3 needs hardware update and workaround are identified. Launch date planned in 2016.**

Thank you for your attention!

- Visit our web site: http://www.cnes.fr and http://smsc.cnes.fr/IASI/
- and Ether one: http://ether.ipsl.jussieu.fr

- EUMETSAT site: www.eumetsat.int
- TAS site: www.thalesonline.com/space