

ESOC

26 November 2007

Attendants

Arvind Parmar	ESA, ESTEC	AP
Michael Schmidt	ESA, ESOC	MS
Richard Southworth	ESA, ESOC	RS
Salma Fahmy	ESA, ESOC	SF
Federico Di Marco	ESA, ESOC	FDM
Frank Dreger	ESA, ESOC	FD
Peter Kretschmar	ESA, ESAC	PK
Angela Bazzano	IASF Roma	AB
Lorenzo Natalucci	IASF Roma	LN
François Lebrun	CEA Saclay	FL
Jean-Pierre Roques	CESR Toulouse	JPR
Elizabeth Jourdain	CESR Toulouse	EJ
Roland Diehl	MPE	RD
Federico Cordero	SPI, VEGA	FC
Søren Brandt	DNSS	SB
Volker Beckmann	ISDC	VB

1 Welcome & Agenda — PK

The Agenda was accepted. A presentation by FC on TM will be included in the telemetry discussion.

2 Open Anomaly Reports — MOC

2.1 SPI

Upcoming IASW patch will solve INT_SC-170 and INT_SC-205.

Nothing do be done about GeD12 (INT_SC-180) for the moment.

2.2 IBIS

INT_SC-130: Problem happens occasionally. Workaround in place. Closing proposed.

INT_SC-183: Keep open & monitor

INT_SC-184: Nothing to be done, close.

INT_SC-185: Keep open & monitor

INT_SC-198: Keep open & monitor

INT_SC-207: Keep open & monitor

2.3 JEM-X

DFEE CRC anomaly - no explanation, have to live with it. Keep open.

INT_SC-201 (DPE crash): SEU, closed

INT_SC-203 + INT_SC-204 (CSSW anomalies): No explanation, can be closed.

2.4 OMC

No open problems.

3 Operations Status

3.1 Spacecraft — MS

Very few anomalies. S/C running very well. MS had meeting with representatives of OKB in Russia last week. Use of Bear Lake station has been tested in the context of a shadow track. The tests were promising concerning the link budgets for the downlink. May be discussed in bilateral director's meeting in December.

Some problems with links to ground stations and to ISDC. Has improved without clear reason. MOC is now moving backup chain to different room (new IP addresses).

3.2 SPI — JPR

Annealing #10 took place in early June, without coldbox outgassing. GeD#12 has degraded performance at higher temperature, is run at 3.5 kV. The long-term evolution shows a slight degradation trend in resolution.

Next annealing should be done in early January, even though degradation will exceed previous maximum in order to increase annealing intervals.

Telemetry usage rate still increasing, but worrying is that margin is only 5 packets and increase is 0.5 packets / month.

Various solutions possible, with various trade-offs. Should event lists be compressed on-board? Would that be possible?

3.3 IBIS — FDM for GDL

Status is nominal. Anomalies involve mainly the Veto system.

Open issues: redundant unit, IBIS2, needs to be tested. Action Co/08-03 still open. Procedures are ready, but ODB must be checked. May need 2-3 days of cooperation between IBIS team and MOC. Procedures are ready, but ODB must be checked.

Action 13-1 on SF and FDM	Due: end Nov
<i>Organize meeting MOC/IBIS on redundant unit in December</i>	

JPR asks if full procedure for using redundant unit is in place. Redundant unit must be recommissioned. Some discussion if it is worth to draft a plan for this. A plan was not considered necessary at this stage, but basic preparatory work, like checking ODB etc should be done. Work is ongoing at MOC.

Action TWG/04 (PICsIT PPM during slews) is still pending. Proposed solution is to tune lower & upper energy threshold waiting for input from Bologna.

Action 13–2 on AB	Due: end Nov
--------------------------	---------------------

Take decision on PICsIT settings if no input from Bologna has been received.
--

TLM rate is increasing roughly 3.5 packets / year.

There is no real safe configuration for IBIS. MOC procedure "transition to Safe Mode" is in place and is safest option.

3.4 JEM-X — SB

Gain history was presented. Next lowering foreseen for orbit 622 or 623. Gain is temperature dependent. Sensitivity has increased from ~1% per degree to ~3% per degree of detector temperature. This adds significant noise in the gain history. Worst case in revolution 614 (eclipse season) - temperature varying between 16 and 26 degrees C.

Time interval between steps increasing (~1 per year in future). Spatial gain map evolving, this can be traced with Xe line.

Anode loss ~2-3% per year. JEM-X 1 with ~450 orbits in user has lost 54 anodes so far, JEM-X 2 with ~175 orbits has lost 49.

H/W trigger rate still increasing, has gone up by factor ~2 since launch. Has increased deadtime from about 12% to 18%.

Use of old IC file led to data being flagged as bad at ISDC – starting in revolution 590.

Prefer to JEM-X 1 while it performs well. Maybe in a year.

3.5 OMC — PK for OMC team

Operations run smoothly, no open issues, analysis software stable. Contaminations seen in flatfields stabilizing but best information on small-scale structures still coming from Earth observations. New calibration scheme to give better small-scale information not yet implemented.

3.6 ISOC — PK

Software team has changed from P. Balm and M. Bindels to S. De Castro and P. J. Baeck. Handover has been mostly smooth but not completely. One issue is the rollangle stepping between subsequent patterns which was implemented incorrectly and has been now fixed. AO6-KP preparations are going smooth, deadline is 30 Nov.

3.7 ISDC — VB

Swiss financial support has been approved for next year. Decreasing number of scientists with Integral experience, more involvement of operators in science operations. Switching to OSA7 in NRT system. Ingo Kreykenbohm (SPI expert) leaving.

The re-establishment of some operational expertise at ISDC was discussed between MOC and ISDC in the past. ISDC states that it is not foreseen to build-up again operational know-how.

PK proposes a somewhat stronger involvements of ISOC scientists inoperational knowledge.

4 SPI tuning — JPR

Instrument will have evolved after 5 years in orbit. Need for a new optimization. Tuning areas include: ACS, DFEE and GeD HV settings.

HV change would be most urgent. To test this, would need to run few revolutions with different HV. Would not affect spectral response. AP proposes to do this in revolutions which are mainly IBIS oriented and/or lower priority targets. Should be done not too far after annealing.

Action 13–3 on PK <i>Check for suitable target revolutions for SPI HV tuning.</i>	Due: end Nov
---	---------------------

Action 13–4 on JPR <i>Issue formal request for SPI HV tuning.</i>	Due: end Nov
---	---------------------

5 Safe Configurations — All

SPI has a considerable overhead to get from safe mode into science operations again; therefore the threshold for initiating 'safe mode' on anomalies should be high; goal is to recover, not to go to a safe mode. Different 'safe' configurations depending on anomaly. Basic idea is "go to standby" which is clear. Main problems are related with HV. Baseline is first try recovery procedures, second try to contact PI, if PI cannot be reached, go to stand-by.

Action 13–5 on FC, JPR <i>Review existing procedures regarding SPI HV problems and report.</i>	Due: end Jan 2008
--	--------------------------

A failure of the cryocooler would be a major problem, it is not clear if procedures are in place for all contingencies.

Action 13–6 on SF <i>Contact G. Sarri to obtain information on cryocooler to clarify the required contingency procedures in case of anomalies.</i>	Due: end Jan 2008
--	--------------------------

For IBIS procedures are clear enough. If recovery fails, go to standby. This can be supported for extended times. If recovered after longer switch-off recalibration is needed.

For JEM-X in similar situation, procedures are in place. Can be sustained for extended periods.

For OMC the situation is very straightforward, no problems foreseen.

The baseline for all instruments remains – different from the XMM approach – to first try recovery and only later go to 'safe' modes. PI teams will continued to be contacted, if possible.

6 Effects of manpower reduction at MOC

Fewer people will be available and they will have less experience. Current experienced staff might leave also in future. System must be set up more failsafe.

Implementation of special wishes and change requests will take few weeks instead of days. SPI annealing, for example, must be planned around availability of personnel.

Reporting may need to be reduced, no cuts yet. Weekly reports force people to look back, which has served to identify anomalies. But some reduction must be expected, e.g., one week could go by without a report.

7 Telemetry share

FC discussed ways to improve telemetry usage. One option is event compression – only relying on events within same frame. This was not further discussed.

Integral has a bandwidth of 256 packets/8s, with fixed PST distribution. Currently the average loss is 27.5 packets/8s (~11%) Case of full usage is essentially *never* used.

FDM: study of loss should be checked with various revolutions, different targets, etc.

Different approaches to implement a dynamic scheme were presented (see vgs). Would imply major changes not only in onboard software, but also in Ground Segment. While promising as idea, it seems to late in the mission to implement major changes in the onboard software. A test on the use of the buffer shall be done, e.g., in the next Crab calibration.

As explained in vg, 3 telemetry packets for platform on-request TM could be immediately reassigned to payload.

Action 13–7 on RS and FDM

Due: end Dec

Run test on simulator. Provide short report on possible side effects of reassigning 3 TM packets and CDMU changes.

8 Time correlation

RS summarized situation. Requirement is accuracy of 50 μ s. In Crab data a scatter of 150 μ s was found by ISDC. Traced back to the handling of the orbit data by the mission control system. The orbit data were not always updated when they should have been – this introduced drifts. Caused by software change in 2005. Since fix was introduced the maximum error has been 23 μ s

Reprocessing of historical data agreed. Test shows generally an improvement, but sometimes correction goes wrong way or is smaller than expected. Sent data to ISDC early in September, waiting for feedback. ISDC delayed, somewhat relying on SRON group. SB & FL also expressed interest in testing these files.

Action 13–8 on VB

Due: end Nov

Inquire about time correlation processing and make time correlation files available to instrument teams for testing.

9 Secure Missions Operations Project — RS

Isolate A and B chain hardware with different locations and different LAN environment. IP addresses for FTS etc will change. RS has list of IP addresses and will circulate.

Action 13–9 on RS	Due: end Nov
--------------------------	---------------------

<i>Circulate new IP addresses and timeplan for changes.</i>

10 Roles and responsibilities of PIs

The responsibilities of PIs in the project remain unchanged (see Science Management Plan) but the actual implementation and arrangements are unclear. JPR emphasized that as ISWT has been dissolved, the PIs perceive a lack of a formal framework for their role. The updates to the IUG Terms of References are still unsettled, circulated drafts have been irritating to PIs.

AP proposes to maybe have two bodies with the IUG advising the PS and a technical group (roughly this meeting) advising the MM.

Action 13–10 on AP	Due: Jan 2008
---------------------------	----------------------

<i>Propose a scheme how to involve PIs formally in the future.</i>
--

11 OSA & Crab results

11.1 IBIS — FL & LN

Main improvement in OSA7 is better energy correction. First correction of residual shift led to changes in Crab lightcurves – caused by drift in lower threshold. Drift is risetime dependent, mainly affecting low energies.

Improved Monte Carlo modelling has led to a much better spectral response, although second order corrections are still necessary. Results are close to SPI results with a slope of 2.15 for $E < 80$ keV. Spectral break and slope above it cannot be well constrained. Data can now be extracted down to 15 keV but at low energies off-axis corrections would need to be updated.

For Crab, power law slope is 2.08 ± 0.01 , 2.32 above break at 100 keV (fixed).

ISDC claims to have found an improved procedure for imaging, but this was not confirmed at Saclay – discussions are ongoing.

Reconstruction limited by attitude accuracy: for a 0.01% correction an attitude accuracy of $0.07''$ would be required. The mechanical accuracy of ISGRI is $50 \mu\text{m}$, corresponding to $3.2''$. Difference between model of mask and real data shows signatures of bolts, used to fix them (8 cm). A worrying note is that some show up even for on-axis sources.

For bright sources, part of flux may be backscattered, giving a second blurred mask image.

In last Crab calibration apparently only 12 pointings were really on-axis and there were two – not exactly identical – pointings.

Action 13–11 on PK

Due: end Dec

Follow up on problems in Crab calibration and report.

SB comments that at the level of accuracy required it may matter that Crab is not truly a point source.

11.2 SPI — EJ

Long term comparison shows good stability over mission. Fitting 5×5 pattern for Rev 605 gives 2.08 ± 0.02 2.23 ± 0.05 (break at 100 keV).

With 100 ks true high energy flux is badly determined, could be improved by factor 2–3 with 500–1000 ks of observation. The 5×5 pattern is essential for this.

11.3 JEM-X — SB

Various improvements have been introduced in OSA7, mainly on gain correction, imaging and dead time correction (see vg). Further improvements still to be done. Preliminary

12 Priorities for next Crab calibration

SPI's priority is to get high energy energy calibration ($\gg 100$ keV) better constrained. Currently the flux uncertainty is $\sim 30\%$ at 500 keV, $\sim 50\%$ at 1 MeV and $\sim 80\%$ at 1.5 MeV. These values could be reduced by a factor of 2–3 with 500–1000 ksec observation with the 5×5 pattern.

It was recommended to present this to the IUG together with source data showing the scientific interest.