# SDAST Meeting #36

Copenhagen 2006-10-26 and 2006-10-27

**Participants**: NL, CAO, SB, JC, CBJ, and NJW from DNSC
Stéphane Paltani, ISDC
Silvia Martínez-Nuñez, University of Valencia
Peter Kretschmar, ESAC

**Welcome** address by NL. SMN will take a post-doc position in Alicante in the beginnign of 2007. Her continued support for JEM-X is uncertain.

**JEM-X status (SB):** HW trigger rate continues to increase due to solar minimum which leads to increased dead time but has no effect on the rate of accepted events. An increased loss rate of anodes due to this is expected.
The orbit of INTEGRAL has changed with respect to the radiation belts so that switch-on after belt exit happens earlier and earlier and lapse between switch-off and belt entry has increased.
Crab calibration in revol. 483 was conducted with various tests (low voltage, old rejection criteria, only one anode section activated).
The source position is affected by the temperature changes as seen in the mask temperature.
No obvious correlation between anode loss and gain value.
In the future up to 2010 we expect about 10 steps of HV reductions; changes of the spatial gain map; foresee more complicated HV activation procedure.
The work of MOC, ISOC, and ISDC (also shift team) is appreciated. The instrument station situated at ISDC as a monitoring setup is very convenient and essential for saving datatypes ignored by ISDC processing.

**News from ISDC and OSA (SP):** All software has been delivered but ISGRI repsonses are delayed. The release of OSA6 will probably happen in two or three weeks.
Waiting for updated list of bad time intervals from the JEM-X team.
Pierre Dubath and Nami Movlawi are moving to the Gaia project. Ingo Kreykenbohm will take up the SPI contactperson job. Simon Shaw has left (but still on-line) and Jan Soldan will also leave soon. Masha Chernyakova will take a job in Dublin in February 2007. The JEM-X tasks (except the liaison part) of Stéphane Paltani should be taken over by some other person, still unidentified.

**News from ESAC/ISOC (PK):** (see contribution)

**Report from IUG and ISWT (NL):** ESA has money problems and the future of INTEGRAL as well as XMM is less certain. Calls for new science proposals originally due for coming spring has been postponed. Message: Keep up the publication rate and scientific initiatives.

**JEM-X representatives at ISDC (JC):** CBJ will be the visitor in November (to discuss spectral extraction from images and the thermal effects on source positioning). ISDC will take over the maintenance of the scripts so there is no immediate need for a SMN visit. A December 2006 visit should be in the week that starts 11$^{th}$. We should aim that NL and/or NJW should go there in

January 2007. CAO can take a turn in February or later. See JEM-X forum page (under “Instrument specific software for developpers”) for the proposed list of representatives.
FORUM: http://www.spacecenter.dk/~oxborrow/sdast/JEM-Xforum.html

**OSA6 investigations by ISDC about JEM-X (SP):** Should the gain correction follow the FRSS curves in more detail (except the glitches)? A temperature change has influence on the gain and could – in principle – be used for better gain correction.

*Action* (**SS**?): Find a situation where the gain correction can be improved and determine how large the effect is – in other words: How important are more accurate gain corrections?

There is a (growing) need for getting access to HK data for the whole revolution. SP explains that better communation between the JEM-X team and ISDC is required. We need to describe exactly what kind of information is needed and send it to SP; then he promises that a solution will be found if the request is well argued. Just writing a SCREW is not sufficient.

Crab light curves at high energy (15-30 keV) seem to show that the JEM-X lc extraction varies at short timescales or as a function of position in FOV.
A Crab spectrum summed over all observations is analyzed and shows that there are problems with the ARF at low energy and at high energy e.g. the Xe-line appears.
The spectral extraction has changed between OSA5.1 and OSA6 although the software is basically the same except j_cor_gain. This is a mystery.
The JEM-X2+SPI+PICsIT Crab spectra agree very nicely with a slope of 2.13. Note the omission of ISGRI.
A spectrum extracted 1 deg away from the Crab gives a 60 mCrab source with a spectrum somewhat steeper than the Crab.

Spectral extraction with mosaic_spec (SP): Crab spectrum, when extracted in 8 energy channels, is a bit steeper than the reference value. An off-axis comparison between j_src_spectra and mosaic_spec in OSA6 shows a small but significant difference.

Discussion: Perhaps the normalization of a spectral model (flux at 1 keV) is a bad parameter and it would be better to use e.g. the XSPEC flux between say 5 and 20 keV.

*Action* (**NJW**): What are the changes in IMOD etc. between OSA5.1 and OSA6? Report to SP.

Analysis of 3C273 data shows that the spectral normalization varies between j_src_spectra and mosaic_spec.

The spectra from JMXi-SRCL-RES can also be used, but they seem to be steeper (and hence have a higher normalization) than they should have been; the same thing that is seen in j_src_properties.

Should j_src_spectra be eliminated from OSA6 ? PK says no, because j_src_spectra works well for a strong source. The use of mosaic_spec requires about 60 energy channels for strong sources and about 30 channels for weak sources in order to have proper sampling (oversampling).

Recommandation for the user: Avoid using j_src_spectra for a (weak) source with a strong source in the FOV. Double check spectra with both methods. Specific ARFs for mosaic_spec should be produced in order to prove that the spectra are in order.

*Action* (**SP** and **NJW**): ISDC (i.e. SP) should provide spectra for NJW who will provide the ARFs.

**JEM-X deliveries for OSA6** (CAO, NJW, JC, SMN): **j_calib_gain_fitting**: New functionality, namely adding up weak calibration spectra before fitting. **j_cor_gain**: New functionality for input JMXi-GAIN-OCL (Offline Calibration Table)

- Accepts ISDC-generated
- Outputs JMXi-GAIN-SCP (Science Parameter) with actually used gain corrections

**j_cor_position**: Randomized event positions around table value.
**j_dead_time_calc**: Handles cases where ORHK data mix with CSSW data.

**j_ima_iros** (NJW): Most important changes are

- New IMATYPE keyword values (RECONSTRUCTED, RECTIFIED)
- Neighbor correction implemented
- Several SPRs and SCREWs fulfilled (A few remaining and new ones, though)

Discussion: j_ima_iros should produce an image even if there is no or a very low number of counts in the shadowgram in stead of just skipping it as required by SPR 4594.

**j_ima_mosaic** (JC): New IMATYPE keywords taken into account. SCREW 1852 (writing input image DOLs in the mosaic FITS header) has been rejected and this was discussed (once again). We should come up with good arguments for this list and perhaps another way (a new data structure) to contain the DOLs of the input images. Other information could put given as well (temperature, current gain are examples).

**Scripts** (SMN): Background level has been completely removed. Implemented applying bad time intervals (BTI). Obtain attitude from gti_attitude.

Remember to include the script as affected item when a SCREW and SPR suggests a change of parameters.

**Binning tools**: A small change in handling the timestep parameter was introduced to allow for the zero value meaning ‘all data’.

**Status of j_src_properties (NJW, NL):** In principle it works but results are bad. NL has been looking into the detector response and finds that the modelling shows some strange features. Work continues. Ideas: try imaging with a single photon; compare with j_src_spectra PIF.

**Alternative spectral extraction (CBJ):** Cross-correlation method. A combination of this method and j_ima_fine_resol (that provides the appropriate DAL framework) has a potential for being used in future versions of OSA. SP proposes to import the IDL code to ISDC and translate it to an ISDC compatible version during Carl’s visit to ISDC in November 2006.

**Status of j_ima_src_locator (NJW):** Has not quite reached the state to be included as an OSA component, but it is quite close now. The source acceptance critera must be refined as well as the application of the variance map (if present) must be possible.

**Imaging and source fluxes (JC):** There are changes between OSA5.1 and OSA6 (see contribution). Discussion about the best method for flux extraction in various circumstances. The best way to determine the flux should be identified by the PI.

A clear statement about contamination from a strong source will appear in j_src_spectra and j_src_lc results must be included in the documentation. A further investigation by e.g. mosaic_spec could throw some light on the question.

**JEM-X Electronic efficiency (CBJ):** Analysis of Crab calibration data taken with reduced HV combined with nominal voltage. (see contribution). The resulting EEFF (electronic efficiency) curve shows a surprising lower efficiency for new rejection criteria at the low signals – in contrast to the expected higher efficiency. Perhaps because the parameters for the rejection were derived at different gain.

An architectural design of j_src_properties is requested by PK and ISDC (SP). NL points out that a technical note has been issued half a year ago.

**Note by CAO:** All important technical and other notes should be sent to CAO to be uploaded to the JEM-X Forum web page (http://www.spacecenter.dk/~oxborrow/sdast/JEM-Xforum.html).

**Search for unusually long X-ray bursts (JC):** part of a key programme (se contribution).

**How to get temperature corrections from OMC pointing? (NL):** Not particularly useful; can be used as an indicator, but the analysis and parameters derived by CBJ are more suitable for JEM-X.

**Manual gain history tables as IC files (CAO):** One example for JMX2 and nine for JMX1 (revols. e.g. 276, 417,418, 422). Have been delivered for OSA6.

**SVR update (NJW + all):**
Chap 2: To be updated by CAO
Chap 3: NL+NJW will update (description of j_ima_iros goes to ADD); add PSF information; description of IMATYPEs.
Chap 4: Update of position plots (send source list to SP; make sure to represent several rotation angles and off-axis angles). Figure of source detection to be replaced by NL plot (faked Crab observation).
Chap 5: To be updated by JC
Chap 6: Contamination part to be added (NJW+JC). mosaic_spec description should be added (SP will do that). The Crab calibration part to be updated by NJW with input from ISDC on all Crab spectral analysis. Spectrum of weak source to be updated; contamination part discussed; recommend mosaic_spec. For an example of a light curve use JC long burst light curve. Add greyfilter values to Crab lightcurve errorbar plot (or just plot error bar size as function of greyfilter). Remove period folding and replace with a plot from SB paper on timing (updated with new eventlist). SB will do that.
Chap 7: Updated with Earth Occultation results. The spectral and spatial background distribution should be displayed. The plot of background to be replaced with figure where typical regions of use are be marked.
Chap 8: Should be removed.

**ADD update (JC):** Remove 3.6 bkg. 4.6 flux units to be updated. 5.13.1 (j_ima_iros) A description of jmx_lib_pif should be added. Remove chapter on Sami's HK extraction. JC is editor of ADD.

**Person power (all):** PK will have very close to zero time for JEM-X development, so the binning tools must be handed over to somebody e.g. the coming JEM-X extra person at ISDC. The responsibility for the scripts is handed over to ISDC.

**Old action items (CAO)**: http://www.spacecenter.dk/~oxborrow/sdast/AIlist.html

No new meeting time was fixed. This must be dealt with in a chat or as an email discussion.

/NJW