Minutes of the SDAST meeting #34, 2005-12-12 & 2005-12-13

Review of old action items: See the SDAST Forum for updates (AI29-2, AI30-11, AI30-15 no longer required; AI27-7, AI 29-1, AI30-5, AI30-6 got new dates; AI30-8, AI30-10 closed; AI050615-1 ongoing).

A small discussion concluded that we should continue supporting the REST mode of JEM-X since there are observations in that mode. The modes SPEC and SPTI may cease to be supported in the future.

The operation status web page by SB: It has been delayed because DNSC has not finished setting up the internal web page, but when this is done the status web page will be created.

ISDC news (AN): OSA5.1 has been released. For AO4 and the related core program defining keyprojects (mainly observations that SWIFT cannot do) will be the main strategy. Upcoming Earth observation: Using first active hours of each revolution (i.e. after exit of radiation belt) in a number of revolutions to have the Earth blocking as large a piece of the FOV as possible. The operation is not simple and the first results will be used to decide if these observations should be continued (7 revolutions are foreseen). The GUIs for all instruments have been improved. Multiple new ARFs have been delivered for ISGRI.

JEM-X status (SB): Two hot spots on the detector (JMX1) are placed directly on two amplifiers. They vary in intensity but so far the highest count rate is 4 cts/s when averaged over more than several minutes, so they do not use so much telemetry but can peak to 500 cts/s in sharp bursts.
Gain as a function of temperature: 2% gain increase per degreeC (this number was 1% in the beginning of the mission). The energy resolution dependence on temperature is absent or very weak. It will, however, increase for very low temperatures as observed in pre-flight tests.
The Crab spectrum can be used for testing for gain effects for the detection efficiency. We should probably ask for more of this kind of observations with a (limited) range of HV settings.
A OMC flatfield observation has been used for HV stepping to exploit the calibration sources for efficiency investigations.
Energy resolution and position resolution can also be obtained from this exercise.
JC: Only a single anode lost in this year (2005-08-04, RAWX = 172, previous one lost was 2004-12-17, RAWX = 212). The calibration sources have now decayed so much that the data collection procedure for gain calibration may have to change soon i.e. longer periods. The ISSW has to deal with this situation.

ARF and gain dependent sensitivity (NJW): Based photon detection efficiencies obtained from the above mentioned exercises with HV settings (input from SB and CBJ) the ARF has been predicted for several Crab observations. When compared with the ‘required’ ARF (i.e. the one necessary to reproduce the canonical Crab spectral parameters) the match is not satisfactory. This must be understood.

Alignment and source positions (CBJ): Using ‘private’ IDL software it has been possible to achieve a position accuracy for 20 strong point sources of better than 3 arcsec (1 sigma) when all available data are combined. J_ima_iros cannot (yet) come to this precision and work is continued to improve it. It has been shown however that detector position resolution is a function of both position (w.r.t. amplifiers), PHA (and hence gain) which complicates this modelling.

Current spectral extraction (SL): The ideas behind the component were presented as well as an overview of the most important pieces of the code. This includes: Calculation of PIFs, flagging of events, evaluation of peak 'leakage', background determination from open and closed areas. The homepage "http://www.astro.su.se/groups/head/SL/JEMX/src_pif.html" documents these functions.

News from ISOC/ESAC (PK): PK is now also GS co-ordinator. Planning: AOCS (non-standard) calibration, Xmas period will mainly be used for nucleosynthesis observations, SPI annealing in revol. 396, Earth Occultation observation is rather complicated on the planning side (a lot of non-standard manoeuvres and overriding safety measures). ISOC updates AO4 and helpdesk software.

Discussion of the new spectral extraction – j_src_properties (NL, NJW, + all): The PIF can be presented as a map, a shadowgram, or as a value connected to each event and outputting both should be possible. The cross-talk between sources must be minimized which requires a solution for all sources seen in the FOV simultaneously. AN reported that ISDC is very keen on being informed about this process and encourages us to produce a time schedule (it could have impact on the thoughts about the release date for OSA6).

ADD update (JC): Major updates are needed for the image tools: j_ima_iros and j_ima_mosaic. All ICAL is to be removed. SMN will take over the responsibility for documenting the scripts. The due date for contributions is 2006-01-15 and it is important not to miss it.

Science presentations:
SL: Made an oral status report for GLAST
NL: Described briefly ideas about a Laue lens as a future ESA gamma-ray mission.
SMN: The paper onV0332+53 has now been accepted, but better JEM-X ISSW is required for further analysis. Astro-ph 0512285.
SB: XTE J1739-285 bursts show it is an NS system contrary to previous belief.
JC: Mosaic analysis of the region around GRS1915+105 from private observations in October 2005.
AN: Neutrino MSM as warm Dark Matter.

Problem with on-target flag and GTI ? (SB): A case where the on-target flag has been set to zero within a GTI has been found, but the GTI should reflect the on-target flag status, so is there anything wrong or another way of testing the quality of the pointing? AN should carry this question to ISDC and check how the on-target flag influences the event selection. (Send this question to SP).

SVR update. Distribution of tasks (NJW):
We plan to deliver this document at the latest in January 2006.
Data correction: CAO input, check for new version of gain evolution by SB.
State that degradation of energy resolution has not evolved further – the trend for JMX1 continues (use same y-axis for both JMX1 and JMX2 or merge into a single figure).
CAO will supply new figure for Xe line resolution (with new SPAG table). Should we bring a Xe line position figure (as function of revolution number)? Maybe not, but we should mention that the Xe line is used for gain correction quality assessment and give a reference to the gain webpage (http://www.spacecenter.dk/~oxborrow/sdast/GAINresults.htm).
Make sure that the same formula for energy resolution appear in all reports (SVR, Observer's manual and Analysis user manual) or remove it completely.

Imaging: Cut down the description of j_ima_iros but bring a limit for source detection reliability. Bring examples of images with weak sources that we trust and perhaps examples of look-alike sources that should not be trusted. What we say about the flux?
Remove section 3.4 with example of image generation.
Chapter 4 on source detection. The source position plots are being redone. PK repeat the runs for the Crab position plots. DNSC should supply PK with a science window list. For sensitivity we can bring the same figure (Plot of detection limit versus effective integration time). On source fluxes: We must find out (viz. the plot by SP) whether the lightcurve flux or j_ima_iros flux is better.
Chapter 5 on image mosaics. JC has new input for sensitivity in mosaic images.
Chapter 6 on source spectra and light curves. Crab spectral fits to be redone. SMN will provide a new analysis of a weak source. One could show as a capability that the flux, lightcurve, of Cyg X-1 in JMX1 and JMX2 track each other quite well. Use full detector light curve for pulse detections and compare with results from source extraction.
Find out about the parameter 'diagnosticMode' for j_src_spectra and how it appears in the GUI.
Select a few science windows and run j_src_lc and j_ima_iros with high 'chatter' values to find out what goes on (action on SL and NL).

JEM-X Observer's Manual:
PK will be organizing the update. Figure 6 should be updated with more data (larger integration time). New figure for sensitivity. Page 28, table on countrates from the Crab should be changed, updated because there is a difference between JMX1 and JMX2. Emphasize that the actual gain will determine the countrate.
Timescale: Deliver new material in beginning of January at the latest to PK.

JEM-X Analysis User Manual:
AN has made few changes e.g. about the GUI. If we find a preferred way to extract a flux it should probably bring it also in this manual.

The flux and source detection significance in mosaic images (JC): The number-of-sigmas for a source is found by turning the significance map into a sigma-map: Divide by the width of the distribution. A new figure for detection sensitivity has been produced.

Restricted imaging: Remember to raise the question of redefining the restricted imaging PI intervals to the ones for FULL imaging and thereby minimize the loss of resolution caused by the coarse rebinning.

Mosaicking of combinations of full imaging images and restricted imaging images gives strange results. We should check if the j_ima_iros makes OK images from restricted imaging sky images.

We could implement the logic that when the catalog source position error is smaller than a certain value then this source should be included in the further analysis with the catalog position rather than the found position.

Use of other calibration sources (TO presented by NJW): Other sources than the Crab could be used but there are no other steady and reasonably bright sources. Strong line features could monitor the quality of the gain correction independent of the source intensity and here is Cas A a good case with a strong Fe-line. TO has documented and change in the line position with time and the reasons for

this (probably due to the gain calibration) must be found. One could also look for accreting pulsars for detectable line features.

We should define a list of specific tests for the test sequence conducted by Simona Soldi e.g. that the source position in the mosaic image match both the catalog position and individual science window positions. There must be input from everyone on the team for such specific tests. The discussion on the goal for such tests:

- Serve as a reference for future software developments
- Demonstrate the current state of the art
- Provide input for the SVR and other reports
- Disclose weak points in the data analysis

The next meeting was tentatively scheduled in early April 2006.

The action items from this meeting will be put in the SDAST Forum: AI34-1 NL is teamleader for CBJ/NL/NJW to determine azimuthal angle characterization parameters such as vignetting, collimator tilt and spatial gain correction.

DNSC/2005-12-19/NJW