SDAST Meeting. 22nd November 2011
at DNSI, DTU-Space, South.

Participants: Lucia Pavan, Carl Budtz Joergensen, Erik Kuulkers, Soeren Brandt, Niels Lund, Jerome Chenevez, Niels Joergen Westergaard, Carol Anne Oxborrow, Silvia Martinez Nunez (via video conference)

SB: JEM-X and INTEGRAL status (see his presentation)

-Solar activity increasing, CR background decreasing, and JEM-X telemetry can be increased (but not by very much, and only for bright sources)
-JEM-X after-perigee switch on has been streamlined for single operator operations
-MOC proposal is a clear case of "if it ain't broke don't fix it"
-With two instruments with dead anodes we have an effective area that's significantly larger than one instrument
-Hot strip event energies are assigned unphysically low values - it's a processing anomaly because these sparking events do not produce a good backplane signal, not being real events. Flagging unphysically low energy events removes this problem entirely - will not affect imaging.
-Hotspot signal pulses very regularly for a while then stops.
-Gain increase effect due to ion diffusion in the glass was a known effect even before launch, but it's proved to be quite strong, especially given
that the mission has far exceeded its 2-5year mandate.
-An ion diffusion-free glass simply couldn't be obtained in time to build the instruments.
-Gain has increased by a factor 4 with its original HV setting
-This effect also exacerbated by the increased temperature sensitivity.
-Looking towards the Sun causes the highest temperatures, but looking away from the Sun is almost as bad.
-When both units are running, they are warmer because of heat from their electronics, about 3deg higher than with just one unit running
-Just as well we didn't implement and onboard gain correction function now that so much needs to be done by hand and the calibration sources are so weak.
-Gain variations are big problem in gas/proportional counters in general
-Our CR particle rate is clearly decreasing, but is still not as low as just after launch
-Trying to improve our understanding of deadtime corrections
-DV (drift voltage) test measured the electronic efficiency
-If you apply the correct deadtime correction to the software triggers you should be able to re-create the hardware triggers, but that doesn't happen at the moment.
-This is probably due to double triggers on long electron clouds produced by a single event with a low drift voltage. Just how frequent are these double triggers?
-Suggests we should run with a higher DV setting, but DV and HV settings are linked in a complex manner. So DV has been lowered along with HV due to the gain increase.
-Difficult to check these things in detail because the full diagnositic mode events are very telemetry intensive
-Are we rejecting good events when the background is high?
-Delta-time analysis suggests that the signal is actually riding on a wave in the slow-anode signal that is not cleared before the next event occurs.
-Running with two units is an advantage well over the factor of sqrt(2) in the SNR
-Very unlikely that XMM will be shut down in 2014 - could even continue to 2020, just by technical considerations. So there is a chance that INTEGRAL could piggyback along with XMM to 2016, which would make gain calibration REALLY difficult.

Lucia Pavan: ISDC News

-Carlo Ferrigno is heading INTEGRAL at ISDC
-ISDC is slowly moving scientific personnel to newer missions
-INTEGRAL support is garanteed until end of mission
-EUCLID has been approved which will require manpower
-New ISGRI software is driving new OSA release (date foreseen: January)
-What is JEM-X software situation. No dates for release, so we want to see what can be done in a reasonable amount of time.
-ISDC can adjust (of the order of days/ one week or alike) the delivery date of OSA10 in case JEM-X team needs some extra days. .
-Development time will be a couple of months at most(!)

Erik Kuulkers: ESAC News (see his presentation)

-Scutum arm scan; galactic centre observations, left and right sides; Earth observation; Crab calibrations; IBIS mask calibration (Crab); So lots to cover in AO9, with knock-on effect in AO10
-EK making wonderful PR movies: fly-by of galactic centre in multiwavelength, false colour mode that will appear 3D in motion.
-See the galactic centre animation on YouTube

NJW: JMXi-IMOD-CFTM - Correction for Temporal Changes (see his presentation)

-Collaboration with Silvia to change NL's IROS SW to change images to lightcurves. Much that's needed is still in place
-Not so much progress as yet, so move onto the temporal changes
-JMXi-COLL-MOD is an imperfect description of the collimator but the best we have so far
-JMXi-SPAG-MOD needs to be updated to improve instrument resolution, but SB's last attempt failed, probably because of varying temperature dependence across the plate.
-JMXi-DXBG-MOD is obsolete, unused extragalactic background
-JMXi-EFLT-MOD is obsolete electronic efficiency that was replaced by JMXi-EEFF-MOD
-Green band distribution are the energy bands used by NL's IROS, and black ones are NJW's even PI bands. NB scale on figure is logarithmic
-NJW assumes that the Crab spectrum is constant (could be dangerous)
-Had to introduce new IMOD epochs to cover all the mission, so have 23 epochs now for JEM-X1 and 24 for JEM-X2
-What about the 7-8 keV feature in the spectrum?
-Looks as though it could simply be a binning problem, since one bin has too few counts and the next has too many

AI43_1: NJW, CBJ and NL to look into the 7-8keV feature in the Crab spectra

-Has Silvia worked on the lightcurve extraction? Not much, but may have some time in beginning of next year

NJW: INTEGRAL Cross-Calibration Status (see his presentation)

-Elizabeth Jourdain's report
-The fact that the cross-calibration factors between the instruments are now about 1.0 indicates that they've already introduced factors in their analyses to get the same results. So no new information here.

NL: JEM-X Imaging (see his presentation)

-NL hasn't worked on this since July
-Presentation is almost identical to the one in March
-PIF-selected images are much cleaner and freer of artifacts than the all-pixel images, so that weak sources do come out more clearly
-New version of software is nl_ima_iros, for development version, to allow lightcurve extraction

-"Software that works is just software that hasn't been tested thoroughly enough"
-Weighting is done by making a pixel illumination function for each found source and those pixels with few source hits are only lightly weighted, while pixels which are heavily source illuminated are heavily weighted.
-This method relies on the degeneracy of code-mask shadowgrams - you can remove some of the detector and still get an image of the entire sky. So it makes sense to ignore detector pixels that are mostly noise.
-"It should work!" (like all software)
-PIF-selected software doesn't run significantly longer than previous versions because it only makes one extra back projection, which is not a long step in itself

CBJ: Deadtime verification

-Trying to use the countrate of calibration sources to see if deadtime works correctly
-Background has changed considerably during the mission so we should be able to see how background events affect deadtime.
-Unfortunately, we need to combine calibration source strength together with all sorts of HK data: trigger rates, grey filter etc. but it would require a lot of work to get all these together.
-ISDC system is not set up to easily correlate HK data with science data, but calibration data isn't even science data.

AI43_2 CAO, CBJ and LP to look into getting HK data into the gain history tables that are already made

CAO: The Wonderful World of JEM-X Calibration (see my presentation)

JC: Mosaicking Improvements

-See his presentation
-Making mosaics of large parts of the sky using the world-view tools that are already implemented in the ISDC system - WCS tools
-Ready to deliver within a week
-This requires a new parameter for the scripts to allow the user to use the new functionality
-User can also see how many images contributed to a given pixel in the sky map
-This information will help the user determine how smeared the PSF will be
-Each run produces one projection and one new file
-Unfortunately, to get a whole sky projection in one image, you have to downgrade the angular resolution by a factor 3 due to the size of the maps

JC: Recipes for QLA (no presentation)
JEROME: ADD A SUMMARY HERE!!!!!
- How to determine detection significance etc.
- These tools should be available in the user manuals and cookbook

Erik leaves

Wrapping up:
- Lucia is in charge of j_scripts now
- There will be no new version of j_cor_gain for OSA 10 for the trigger dependence, because this simply doesn't apply for most of the mission, which could mean failed energy correction for revolutions that show no trigger dependence

AI43_3 JC to write a SCREW to get negative spectral bins to work in SCW pipeline

-Is ISDC lc_pick tool still working? This is an ISDC responsibility. Originally made by Peter Kretschmar

LP: Known issues and documentation (see her presentation)

-Run through of additions and subtractions to/from user documentation
-Increase in JEM-X telemetry has not yet been implemented

Personpower Issues
- NL will continue with imaging work, at least to beta testing
- SMN will work on JEM-X in early 2012
- JC will continue analysing data, and make the new version of mosaicking. Only paid to work on INTEGRAL in 2012. Also making a list of targets for NuStar
- CAO 40-50% work on JEM-X for IC table creation
- CBJ will return to daily monitoring of instruments
- SB continues as PI, though he has other responsibilities with ASIM and LOFT
- NJW has responsiblities with NuSTar and LOFT. NuStar will launch in March, so he expects to be busy this year, working on gain calibration with Finn and Nikolai.
- ISDC manpower: support until end of mission and after. Operations, archives and software support will work as usual, but ISDC will not be able to take extra duties in the future for e.g. software development.

  LP or someone like her will still be responsible for the JEM-X documentation, scripts etc. Reiner, Pavel and Philippe will still be there.

JC: ADD update
- We will wait until new OSA components are delivered in February
- There will be a new ADD for the new OSA

AOB
- NJW: BTIs. Where can we find a list of BTIs. How can we override the BTIs.
- GTI_BTI_Names is a hidden parameter, and can be changed to filter out only one (or none) of the 2 different types of BTIs; the default value filters out all BTIs. This functionality will also be introduced in new "Useful recipes" section of the cookbook.
- LP: Bad configuration column in BTI file covers everything except Bad Response that is flagged in the other column for times where gain correction is very bad.
- LP: outstanding SPRs and SCREWs have been cleaned out after checking with SDAST by email. Some are very old and obsolete.
  Work still on-going. LP is waiting inputs from JemX team about the SPRs and SCREWs listed in email to NJW.

AI43_4 JC: To present at next meeting a new plot of significance for JEM-X images adapted for OSA, and also one for mosaics

AI43_5 CAO and LP get together (email/skype) to collaborate on adding HK data to the currently existing all-mission gain history tables.

- Next meeting: April 2012