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JEM-X SDAST Meeting 20: October 9th–10th 2001

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November 29, 2005

Participants

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1 PK: News and Schedule from ISDC

- ISDC now up to 33 people. Newcomers are: Ken Ebisawa, Masha Chernyakova, Aymeric Sauvageon.
- Ken x-ray astronomer, work on QLA, offline analysis and some JEM-X support
- IT must send an instrument representative to ISDC for operations or we will be poorly served by ISDC
- Masha handles user documentation and is starting with JEM-X because we're well advanced in documentation generally
- A third 'temporary' building being built on parking lot
- ISDC currently concentrating on V1 testing and V2 integration — gives a big workload next spring
- OMC and JEMX V2 consolidation slower than expected.
- Stablilisation of V2 ISSW very important right now
- TC wants stable V2 executables and scripts working by January
- V3 must be delivered quite soon, else not stable at launch
- Offline analysis generally delayed

- Schedule reworked to take in delays. V3 schedule agreed with SDAST (see below)
- Schedule: see Peter's overheads
- Scientific validation simulation of test data sets begins in Dec. SV to include ITs. For data sets see below.
- Expect to iron out major problems with this exercise
- ISDC hoping to avoid Scientific Validation in space
- First V3 software to be tested with Payload Calibration data
- Further delays in hardware and software will lead to descoping rather than launch delays
- SVT-E and payload calibration in January 2002
- Masha has circulated lists of improvements to the help files (∗.txt) - "Imagine Thierry using our files!"
- See Peter's overheads for more detail on help files and user documentation
- 'USAGE' should be very generic, short introduction to use
- 'EXAMPLES' should be detailed specific cases of use, with discussion of parameter possibilities

AI 20.1 **AI 20.1:** On PK,SL to Redeliver ISSW using new spectral formats. Due: 26/10/01
AI 20.2 **AI 20.2:** On ALL to Redeliver ISSW using new HK column names. Due: 26/10/01
AI 20.3 **AI 20.3:** On ALL to Improve help files as per Masha's list. Due: 26/11/01

NL: JEM-X Instrument status

- FM1 integrated on Satellite closest to star trackers. Not clear whether this is the same as JEM-X1.
- FM1 has 0.7deg misalignment between collimator and microstrip pattern and 0.4deg misalignment between mask corner cube and collimator
- Instrument model files should cover these instrument traits
- Calibration sources functioning well on FM1 — may need to gather spectra from larger patches of detector due to overflow of calibration photons
- Reversed capacitors on FM1 seen clearly as stripes on X/Y scans
- Corrected by OnBoard matrix using 0.15mm resolution, then transmitted in 256x256 image (0.5mm resolution).
- OB resolution cannot be made better than 1024x1024, so effects not entirely ironed out — may require more on-ground handling. Empty fields may show structure initially
- Problem MAY compromise faint source detection
- Problem only with one co-ordinate
- This problem not present in FM2, as far as we know
- Energy resolution is good—lives up to claims in documentation: FWHM = $0.47\sqrt{(E/KeV)}$

- Significant changes in gain just after switch on, should be handled by j_calib_gain_fitting, though events in 4 minute interval around voltage increases will be flagged as unuseable due to poor gain determination
- "NRT"= 1 hour of data in backlog at ISDC, so one hour of 'future' gain history will always be available at time of doing event gain corrections — enough to model gain decay/steps
- OnBoard Software: maximum event processing rate is about 1200 cts/sec, not 2000 cts/sec that was predicted. i.e. for fastest spectrum format
- Effective deadtime will increase—once first read-in buffer is full have to wait for complete event processing. Dead time determination will be quite complicated
- FM2 being baked—has been verified and welded. Baking finishes next Monday. Next Wednesday comes to DSRI for validation
- FM2 delivery expected 1st Dec. 2001
- FS starts assembly in about 2 weeks for delivery to ESTEC in January 2002
- FS not ready for for payload calibration
- FM1 been very stressed with environmental tests, perhaps should be switched with FS? [Probability of this somewhat greater now with later developments, see below]

2 SM: Interactive Background Analysis

- Showed JEM-X Mass Model simulation results 0–100KeV for JEM-X1 and JEM-X 2 separately. 1.5 MCounts in all from Colin Ferguson
- Most counts at edge of detectors due to secondary radiation from cosmic rays in satelite. No particles shown.
- Background shape must as expected, however most of those simulated will be removed by OBSW — we just don't know which ones.
- Simulated background spectra show strong peaks at approx. 7Kev and 30KeV. Smaller peaks near 24 and 33KeV.
- strangely, 29/30KeV peak strongest in centre of detector: could be due to renomalisation w.r.t. continuum which is strongest at edges.
- NL: Fluoresence created within detector volume rejected by OBSW due to double footprint
- Hard to know how accurate these results are as real background (i.e. counts NOT rejected onboard)
- 29KeV Peak is Xe fluoresence, so should be rejected onboard
- 4KeV could be Ti Kα
- IBH GUI will be based on OSM and isdcroot
- Collection of independant IBH tools invoked from command line with parameter files, or using GUI
- Various display possiblities: view catalogues of backgrounds; background models and parameters
- Colour-coded spectral index map

- Scaling factors viewed by MJD/OBT
- Original shadowgram and image result can be viewed after subtraction of background model
- Long discussion of statistics and importance of IBH at all
- IBH is applied strictly at user descretion
- Spatial models selected from catalogues. Also, new models can be added to BKG database
- Same for spectral models. Software finds scaling factors
- Diffuse sky background can be separated from instrument background because it is modulated by collimator footprint
- New background models/shadowgrams to be calculated from empty fields
- Observed models to be split into instrument and diffuse parts
- Can also add background models provided from outside JEM-X project
- What do we use for background data and parameters in early part of mission?
- Best guesses for initial scaling parameters: no orbit dependence? no attitude dependence? No radiation level dependence?
- Initial spatial distributions will come from simulations, as will spectral models—TIMM for BKG (instrument background), and NJW for DBG (diffuse sky background)
- So important to view empty fields early in mission in dithering mode: artifacts that turn up in same position in pattern will be background artifacts
- PK: Tools for spatial models: use OG with shadowgram and IC data; fit constant and varialbe part, using collimator footprint
- PK: Output will be: spatial models, spectral models and scaling factor
- PK: Tools needed for visualisation and modification of database
- NL worried about statistics: binning of pixels will be needed

AI 20.4 **AI 20.4:** On SM,JH to Find out what 4.9KeV peak is. Due: 11/12/01

3 SM: Performance Monitoring

- Monitors long- and short-term performance
- Interactive analysis of properties of detector
- GUI visualises HK parameters against time or other parameters
- Can select time scale on which to do this
- GUI based on OSM and isdcroot
- Executable collects all HK and calibration data structures into one master table of OGs
- Display HK and calibration data in chosen time interval by MJD or OBTime
- CAO to handle visualisation and handling of calibration data from FRSS spectra in j_ical tools

4 DAY 2

Before the meeting began we learned that FM1, integrated on the satellite had experienced another destructive discharge on the microstripe plate. Currently, IT at ESTEC are trying to burn away the presumed sliver of metal that caused this. At time of writing it is not clear whether one anode segment on FM1 will be lost, or the entire instrument will be swapped with FM2 or FS.

This event may have rendered much of the following information obsolete even before it was presented.

5 NJW: Ferrara Calibration of FM1

For graphs of data see NJWs overheads

- Energy calibration shows that resolution in primary range (0–30KeV) is better than predicted
- Position resolution is close to predicted resolution but not better in primary range—good enough for what we want
- Position scans are still not completely analysed because error discovered in position of X/Y table, so scans have still to be converted to position calibrations

AI 20.5: On CAO,NJW to Keep ISDC informed of instrument status. Due: Ongoing AI 20.5

6 PK: V2 integration loose ends

- Most loose ends cleared up now
- Some delays due to HK parser and database being changed
- Some known problems still pending: source finding still a little shaky
- Pressure on SL to deliver stable versions of his _src_ components
- Need formal delivery by SM of background models as initial background database. Nicolas wants all the necesary files
- V2 software under CC from beginning of November 2001
- Once in CC, all redeliveries must be approved by CCB, based on an already approved SCREW. So those with known updates for their components must write screws on themselves (i.e. for missing functionality)
- SPR is for bugs—a discovered problem
- SCREW is for improving and extending components

AI 20.6: On ALL to To check all IC data has all keywords set. Due: Nov. 2001 AI 20.6
AI 20.7: On CAO to Check why web link to instrument model dead. Due: ASAP AI 20.7
AI 20.8: On PK to Change 'RESPONSIB' to 'Sami Maisala' in BKG templates. Due: ASAP AI 20.8
AI 20.9: On SM to Official delivery of background models to ISDC. Due: End Oct 2001 AI 20.9

7 PK: New unit testing requirements

- ISDC trying to improve/streamline UT procedures
- Unit test makefiles with target 'testcommands' does not change
- Now have a subdirector unit_test/test_data for pristine input test data
- All output goes to subdirectory unit_test/out
- All verified comparison output is put in subdirectory unit_test/outref
- ISDC will run tool isdc_dircmp —it doesn't need another target in the unit test script or makefile
- diff tool will also filter out valid changes in the two outputs
- Make all verification/comparision data at ISDC before delivery, and used a standard seed for SRAND function where randomised data is being written
- Very big unit tests and their data should be tar/zipped and delivered separately

AI 20.10 **AI 20.10:** On PK to Circulate email on unit testing and system environment. Due: ASAP

8 PK: V3 Revised Schedule

- DS9 can be used for visualisation. ISDC is investigating interface class from within isdcroot.
- In future there will also be a root class just for visualisation of astronomical data
- ISDC will not expect us to respond immediately to sudden changes in ISDC interfaces for all ready delivered components, unless we are informed that V3 schedule can be delayed for V1/V2 redeliveries
- j_ical_frss and j_ical_diagnostic both of highest priority
- j_ical_dead lower priority
- j_ical_collimator, j_ical_energy possibly belong to 'V4'. Former known to be very difficult, possibly a 'dream tool'
- Tools needed for payload calibration must be delivered by end of January 2002
- Next formal release of ADD will be end of February 2002
- ∗.txt files must be updated by end of November 2001

AI 20.11 **AI 20.11:** On PK to Investigate exporting OSM to other institutions for V3 development. Due: ASAP
AI 20.12 **AI 20.12:** On SM to Send PK/RR emails detailing specific problems installing OSM. Due: Ongoing
AI 20.13 **AI 20.13:** On NJW,CAO to Assess priority of j-ical tools. Due: ASAP
AI 20.14 **AI 20.14:** On CAO to Add 'Dream Tools' section to ADD, DD chapter. Due: mid Feb 2002

9 PK: Scientific validation and test cases

- ISDC has earmarked end November 2001 to mid Janary 2002 for Scientific verification
- ITs will be needed to design/request certain test cases and perform actual verification of ISSW
- Simulated test data to be made beginning November
- SV involves PK, SL and NJW ISSW since it is already corrected test data. (i.e. not CAO and SM ISSW)
- ISDC makes test data and ISSW available to likely users
- List of test cases to be set down in informal document by IT
- Test cases are lists of different simulations that must be made and analyses that should be done with the data
- IT to use ISSW to see how well it recreates the test data input
- 20 or so test cases is reasonable
- Suggestions from ISDC: Cygnus region simulation (PV target); Field mixing strong and weak sources; Verify PSF and consistency of source countrates.
- Backgrounds cannot be simulated or checked for processing
- Up to IT to do SV tests, not ISDC (i.e. run the ISSW), but must let ISDC know the results
- We will be provided with scripts to run the software
- No HK simulated so some ISSW can't be exercised
- OSIM cannot make simulations of sources outside FOV (or such expected faults as other detectors' masks imprinted on our off-axis data).
- These effects will be investigated during payload calibrations
- First 3 days of PLC will be as realistic as possible without ISOC planning

AI 20.15: On CAO,NJW to Make list of SV test cases with NL for ISDC. Due: end October AI 20.15
AI 20.16: On CAO to Install scripts, RP etc need for SV tests. Due: end November AI 20.16

10 PK: Spectral Format

- Current templates close to OGIP standard, but not directly useable by XSPEC. Translation step required because we need extra ARF file, one per source found.
- New format, XSPEC 11+ supports backgrounds in PHAII and reference by row
- Keith Arnaud proposes 'ARF II' format with columns: ARF_NUM (scalar), ENERG_LO (vector), ENERG_HI(vector) and SPECRESP(vector)
- For JEM-X, all data structures with suffixes -SPE, -DSP, -BSP will be changed to follow PHAII format and ARF data structure will be changed to ARF II format

11 PK: Lightcurve format

- PK worried some XRONOS tool confused by our current format
- Instead of creating more columns for each new source, should create another child in a source lightcurve index table
- But most timing analysis people don't use standard tools for their processing
- New proposal involves a new file for every source, and every energy band
- SL wants a sensible solution and is ready to do the work to get it
- Index would be set up by ISDC as empty table at beginning of ISSW components, then SL would add a new child to the index himself

AI 20.17 **AI 20.17:** On PK to Get ISDC to provide solid list of HK column names. Due: ASAP
AI 20.18 **AI 20.18:** On ALL to Complete updates for ADD 7.0. Due: mid Feb. 2002

12 Action Items

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