



<u>Carlo Ferrigno</u> on behalf of <u>ISDC</u> ESOC Darmstadt 23 February 2010



ISDC status - Staff

Manager: Roland Walter

- Operations (24/7):
 - Carlo Ferrigno ops coordinator + SPI contact (CH)
 - Enrico Bozzo second ops coordinator postDoc (CH)
 - 14 (soon 16) scientists on duty (working hours + half weekend)
 - Pipeline operator: (Philippe Meynis) + 2 support engineers for WE and holidays
- Technical team:
 - Mathias Beck (leader, on call)
 - Tom Payne (system manager, on call)
 - Reiner Rohlfs, Nicolas Morisset, Shaun Ashby, Mohammed Meharga,
 - Pavel Binko (Archive)
- INTEGRAL scientific staff:
 - Andrea Tramacere (Stanford, blazars) has replaced Bruce O'Neel (CH)
 - Pol Bordas (UB, micro-quasars) will replace Carlo Ferrigno (IAAT)
 - Adam Frankowski (Technion, shocks & stars) has replaced Piotr Lubinski (CAMK)
 - PostDoc Lucia Pavan (magnetars & pulsars) (CH), PhD student: Laetitia Gibaud (CESR, AGNs)
 - Marc Tuerler (Web site, Helpdesk), Stephane Paltani (JEM-X, OMC), Nicolas Produit (IBIS)
- Other new high-energy staff at ISDC:
 - Post docs: Andrew Taylor (MPIK, particle acceleration), Jean-Philippe Lenain (Meudon, Blazars), Christian Farnier (Montpelier, Dark matter)
 - PhD students: Matteo Balbo (Padova, pulsars), levgen Vovk (Kiev)

PSDC New layout of web site and newsletter





SAAS-fee INTEGRAL tutorial



ISDC INTEGRAL Planck Gaia Polar Astro-H AHEAD HEAVENS Saas-Fee

40th Saas-Fee Course Astrophysics at Very-High Energies

INTEGRAL Tutorial Session

On Thursday (March 18) (TBC) from 13:30 to 16:15, a tutorial session covering the INTEGRAL mission, science, archive and analysis will be organised by the ISDC, in the lecture hall.

A walk through the INTEGRAL mission

13:30 13:50 14:10 14:40	INTEGRAL mission overview Instruments aboard INTEGRAL INTEGRAL data access and analysis Coffee break	Peter Kretschmar Nicolas Produit Reiner Rohlfs
INTEGR	RAL's main achievements	
15:00	Increasing the knowledge on high mass X-ray binaries	Enrico Bozzo
15:15	Black holes of all scales as seen by INTEGRAL	Claudio Ricci
15:30	Mapping the magnetosphere of bright accreting pulsars	Carlo Ferrigno
15:45	In-depth view of isolated pulsars	Lucia Pavan
16:00	Mapping Galactic diffuse emission	Marc Türler
16:15	End of session More than 100 r	new potential users !



ISDC status – Data downloads





- Average in 2009:
 - 75-100 unique users browsing the archive every month (total number of visits is 150-200/month)
 - 40-60 unique users are downloading about 1TB of public data/month through FTP (total number of FTP visits is 200-250/month)
 - 20-30 unique visitors per month are downloading 0.5 TB/month of private data through ssh (total number of ssh visits: 70-80/month)
- Total in 2009:
 - download rate: 1.5TB/month
 - visits to archive services: 480/month
 - unique visitors: 175/month



- Improved time correlation and energy calibration with respect to revision 2.
- Data are already processed up to rev 791.
- Remaining data are being processed now.
- The archive will be released together with OSA 9 probably in March using the existing w3browse infrastructure.

ISDC status – Operations

- NRT data distributed after a few hours, very appreciated from the community.
- CONS data distributed within ~2 months after the observation.
- Good time intervals with respect to planning since rev 752 (Dec. 2008)
 - 96.77% IBIS
 - 98.95% SPI

- Immediate science results
 - 43 ATELs (5.5/month, peak for the newly discovered millisecond pulsar IGR J17511 3057)
 - 6 GCNs (0.7/month)Since April 2009
- Observation status sent to PIs at the end of each revolution.
- Simplification of system to drift to Linux OS system. Solaris has problematic maintenance. Need some iterations with E(I) SOC for transmission of data.



• PIs get the data revolution by revolution



Previous data distribution

July 2008 - October 2009



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Consolidated data issues

- Currently, it takes up to 2 months from the observation to distribute the consolidated data.
- Part of delay is due to the CD receipt (currently 2 packs per month are shipped). When CDs accumulate, ISDC cannot "flush the buffer" fast enough and the delay between the observation and distribution increases.
- As soon as a problem arises, the total delay becomes significant, so it would be better to receive CDs more frequently.
- In revolution 0795, the consolidated data had less telemetry than NRT, then ISDC used the NRT telemetry.
- In revolution 0800, the problem was identified at MOC and solved, since then, we had no more problems with consolidated data.
- Monitor the GTI to maintain a high percentage.



23.02.2010





Solar Activity - Increasing

- 0867 (18/11/2009) Some solar activity, also detected in the ACS
- 0887 (17/01/2010) Weak to medium. On Jan. 19th at 1340 UTC, Earthorbiting satellites detected the strongest solar flare in almost two years.
- 0892 (01/02/2010) Moderate, flare at ~ 6 a.m. on 03.03.2010 (2*10^-7 W/ m^2, GOES14 1.0-8.0 A)
- 0893 Increasing, multiple flares up to (5*10^-5 W/m^2, GOES14 1.0-8.0 A)
- 0894 Low to moderate. Emergence of new Region 1045 (07 February). Multiple flares up to 4*10^-5 W/m^2 (GOES14 1.0-8.0 A), but decreasing.
- 0895 Flares up to 6*10^-5 W/m^2 (GOES14 1.0-8.0 A)

- 0896 (13/02/2010) Flares up to 4*10^-6 W/m^2 (GOES14 1.0-8.0 A)
- 0897 Few flares up to 3*10^-7 W/ m^2 (GOES14 1.0-8.0 A) JEM-X 2 remained in safe mode, due to radiations, up to pointing 08970005





OSA 9

- Mainly focused on ISGRI with improved imaging and updated IC files.
- Solved issue on NOMEX correction.
- Not updated correction for energy drift of ISGRI.
- Updated calibration files for OMC, SPI and JEM-X plus bug fixes.
- Probable release in March 2010
 OSA 10 prospects
- A new version of JEM-X software for light curves.
- Improve the energy calibration for ISGRI and maybe for SPI in the lower range.





Crab 40-100 keV σ~1300

• Better ISGRI mask model.

ISGRI Crab spectrum Rev 839



- Exposure 110 ks
- 3% systematic error
- Broken power-law
 - G1=2.04+/-0.03
 - G2=2.26+/-0.08
 - Flux [ph/cm²/s at 1keV]= 7.8+/-0.9
- SPI reference: 2.07, 2.24,
 9.1 (Jourdain & Roques,
 2009)

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Jem-X Crab spectra Rev 839



Without systematic error

	JEM-X1	JEM-X1
Γ	$2.026{\pm}0.012$	$1.995{\pm}0.012$
norm	$7.87 {\pm} 0.22$	$8.10{\pm}0.23$
exposures [ks]	97	90

- Fit only above 5 keV, model extended afterwards.
 Systematic error 3%
- Broken power-law
 - G (J1)=2.0+/-0.3
 - G (J2)=2.0+/-0.3
 - Flux1 = 7.5+/-0.5
 - Flux2 = 8.3+/-0.5 [ph/ cm²/s at 1 keV]
- XMM-Newton slope 2.045

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- Crab in dithering 5x5
 wide
- ISGRI: image extracted flux, 20% maximum dispersion
- Tests still to be completed on the long term stability.

Crab stability – JEM-X1-2





Test on ISGRI energy calibration

- OSA energy correction with patch on energy reconstruction (LUT2 interpolation and smooth transition from low to high energy drift corrections)
- Accumulation of histograms in one revolution.
- Continuum subtraction using an algorithm to evidence lines (Sensitive Non Linear Peak clipping algorithm)
- Gaussian + linear background for each line (W_ka 57-59 keV, Pb-Kb 84.9360 keV ^{75m}Ge complex? ~ 144 keV, 511 keV')

Preliminary results





ISGRI Energy calibration

Preliminary with partial data set.



SDC ISGRI Energy reconstruction – worsening of resolution





ISGRI Energy calibration

- The method currently used to subtract the continuum needs to be improved to avoid a possible spurious scatter of the line position. The data base needs to be enlarged.
- Line position presents a remarkable trend in the latest revolutions. This casts doubts on stability of latest Crab based arf calibrations.
- It is remarkable the degradation in the energy resolution. Is it real? Could the LUT1 coefficients have a different time evolution depending on the position on the detector plane?
 - LUT1 correction: pixel dependent, time independent gain and offsets for rise time (RT) and pulse height.
 - Drift correction: based on proton dose of the IREM (RT dependent).
 - LUT2 correction: non linear correction for charge deposit effect depending on RT.



Time correlation

- We have received from MOC an updated time correlation up to Rev 890 (In October 2009, we stopped at rev 792)
- It has been checked to be used in rev_3 by flagging the few outliers, which are then ignored by the SW.
- Once it is ingested in the archive, we will prepare a tar file for the distribution. It is used in rev_3.



Difference between the expected time from previous record and next record at the time of station handover.

Time Correlation – Open issues

- Currently there is an off-set between rev_2 (nrt) and rev_3 time correlation.
- At a certain point we will abandon rev_2 for rev_3, we need to agree a strategy with MOC.
 - Is it possible for MOC to create the currently reprocessed time correlation directly for NRT data?

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