



ESTEC, 10+11 December 2009

Minutes from 13 December 2009

## Attendants

Tomaso Belloni	INAF Brera	TB
Eugene Churazov	IKI Moscow	EC
Andrea Goldwurm	CEA Saclay	AG
Mark Leising	NASA, MFSC	ML
Jörn Wilms	Sternwarte Bamberg & ECAP	JW
Ed van den Heuvel	Univ. Amsterdam	EvdH (Friday)
Giorgo Palumbo	Univ. Bologna	GP
Jacques Paul	APC Paris	JP
Sergei Grebnev	IKI Moscow	SG
Pietro Ubertini	INAF Roma	PU
François Lebrun	CEA Saclay	FL
Jean-Pierre Roques	CESR Toulouse	JPR
Roland Diehl	MPE Garching	RD
Søren Brandt	DTU Space	SB
Roland Walter	ISDC	RW (Thursday)
Carlo Ferrigno <sup>1</sup>	ISDC	CF
Christoph Winkler	ESA, ESTEC	CW
Peter Kretschmar	ESA, ESAC	PK

<sup>1</sup> substituting for RW on Friday

## 1 Welcome, Agenda, Actions

The members of IUG were introduced.

The agenda was accepted. FL's report on software development to be presented with RW's ISDC report. PU and JPR slides on calibration.

The previous minutes were accepted without changes. It was agreed to make all IUG viewgraphs available on the WWW. They will be collected by JW and CW.

An IUG email list will be set up at ESTEC and communicated, the preliminary address `int_iug@sciops.esa.int` is being discarded immediately.

<b>Action 08-1 on CW</b>	<b>Due: 31 Dec 2009</b>
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*Setup new IUG email list at ESTEC.*

Previous actions:

IUG 05-02: Contact Valencia – PK to try once more

IUG-07-01: Converge on TM handling for bright sources – note out, but details to be set at next IOCG Meeting (23 Feb 2010)

IUG-07-02: Cygnus field for calibration – Ongoing, see FL's presentation

## 2 INTEGRAL Management

PK presented the changes in the management structure for INTEGRAL on behalf of A. Parmar (see [viewgraphs](#)). AP is now Head of the Astronomy Science Operations Division and has decided to step down as INTEGRAL Mission Manager. PK has taken over as Mission Manager since 10 October, remaining also head of ISOC. Norbert Schartel has become Deputy Project Scientist for INTEGRAL besides his main role as XMM-Newton Project Scientist.

There was a question regarding the ISDC representative. The IUG consists of external scientists and the former ISWT, of which T. Courvoisier was a member as ISDC PI. RW has taken over INTEGRAL operations from TC and is now representing ISDC in the IUG.

## 3 Mission Status

In the PS Status Report CW presented an overview of the observations done since the last IUG meeting (see [viewgraphs](#)). After some recent confusion, CW emphasized that all formal contact has to go via the INTEGRAL Helpdesk. This has also been put up on the Web-pages.

CW also stressed that because of recent policy changes within ESA any type of outreach has to be approved by management. This includes the Picture Of the Month. January will be POM #100 and he invited propositions.

The publication pages have been upgraded, with a manual list of pre-prints and use of a shared ADS “private library” for the complete list of related papers. The latter includes also technical papers, etc., not included in CW’s publication statistics.

## 4 AO-7 Results

See also [PS Status Report, p.7ff](#).

JW asked if the new two-phase AO scheme really worked as expected. It seems to work well, but has not yet attracted many more users.

There was some discussion on how to attract more users. A widespread agreement held that existing INTEGRAL scientific products should be made available to the community in an easy manner. PK noted that while data from the 3<sup>rd</sup> ISGRI catalogue is available from the archive at ISOC, the data received from Southampton is less complete than for the 2<sup>nd</sup> catalogue.

**Action 08–2 on AB & PU**

**Due: before AO-8 call**

*Make sure full data from 3rd ISGRI catalogue are available to ISOC*

RD mentioned the SPI results on individual sources available at MPE Garching. The ISDC is also preparing pages with source results (see ISDC presentation by RW). PK noted that the existing pages should be advertised in the AO-8 call. NG emphasized the current opportunity with Fermi, as Fermi papers often quote INTEGRAL results.

A proposition from NG to have two-year AOs, allowing for deeper observations was discussed. Such a scheme would be a disadvantage for funding in several countries, compared to yearly AOs. JW proposed instead to allow for up to 4Ms time per AO being allocated to two-year proposals. After an extended discussion IUG agreed to recommend a scheme for two-year proposals approved in one AO and confirmed in the next AO. There should be a special, briefer format for proposals just asking for confirmation under this scheme. The results of this discussion are summarized in Recommendation 24.

## 5 Payload Status

### 5.1 SPI

JPR presented a summary of the SPI status (see [viewgraphs](#)), discussing especially the results of annealing #14 and the LCL trip-off anomaly.

### 5.2 IBIS

PU presented a comparison with the slides for the 2007 Mission Extended Operations Review (MEOR) with the current status (see [viewgraphs](#)). All subsystems are nominal, no redundancy system in use. National support in Italy remains strong.

A well-visited workshop was held in Otranto for the 7<sup>th</sup> birthday. The now published 4th ISGRI catalogue, has a largely increased fraction of AGN and Unknown sources. Some more science highlights were listed.

NG inquired about a possible update of the on-board software to make better use of PICsIT. PU replied that this could be done in principle, but in practice would not be affordable and create a risk for the rest of IBIS.

### 5.3 ISGRI

FL presented the current status of ISGRI, including recent changes in the energy calibration and resolution (see [viewgraphs](#)). The number of disabled pixels varies, but has remained between 500 and 600 (4%) since launch. NG commented that BAT has ~25% dead pixels.

### 5.4 JEM-X

SB gave an update on JEM-X (see [viewgraphs](#)). Since revolution 856, i.e., the start of AO-7 observations, JEM-X 2 is now the default JEM-X unit. The team expects to have many good years with JEM-X 2. When 6–8 TM packets more become available, both units will be used. Anode losses are now down ~1% per year with long stretches without losses.

The JEM-X software for OSA 8 has a significantly improved imaging tool (`j_ima_iros`), including electronic efficiency, better off-axis corrections and improved modeling of the response resolution. Gain fitting and mosaic building have also been improved. Source detection is limited by systematics.

For the next Crab calibration JEM-X requests a 20 ks staring observation at the start of the revolution in order to check gain evolution correction in detail.

JW noted that some users were unhappy with the fact that by the existing AO documentation JEM-X could not be chosen as prime instrument for a proposal. This question was discussed at some length with the main caveat being that observation strategies optimizing JEM-X coverage can compromise use of SPI and the value of the data for archival reasons. The result of this discussion is Recommendation 25.

**Action 08–3 on JW, PK, CW**

**Due: 31 Jan 2010**

*rephrase statement in AO documents to address this recommendation, i.e., also proposals based on Jem-X are explicitly allowed. This statement is to include that hex dithering modes might render the SPI data essentially useless.*

## 6 Calibration Status

### 6.1 ISGRI mask calibration – FL

FL presented an update on the ISGRI mask calibration ([viewgraphs](#)), based on the Crab, Sco X-1, and Cyg X-1. The latter source gives a better measure of the mask corners than the Crab as the field has been observed better at large angles.

**Action 08–4 on FL, ISOC & RD**

**Due: by February 2010**

*Investigate the use of the Cygnus X KP observations in 2010 April/May to cover the corners not well exposed at the moment and allow IUG at its next meeting to make an educated decision on the need of dedicated “corner observations”.*

### 6.2 ISGRI energy drift – FL

FL discussed recently found problems with the ISGRI energy drift (see [viewgraphs](#)). The model is based on IREM data. When these data was lacking there was no extrapolation, leading to a wrong energy calibration and apparent decrease of line energies. The extrapolation has been incorporated in OSA 8, but still is not working perfectly. As an immediate fix an a posteriori correction of event energies based on the Wolfram and 511 keV lines will be implemented.

In addition, a new ARF has been produced and is due to be released to ISDC soon.

Following a short discussion on further calibration needs, IUG adopted in Recommendation 26 that one further revolution in 2010/AO7 be set aside for Crab observations.

## 7 ISDC status – RW

See [ISDC status viewgraphs](#) and [OSA 9 tests at Saclay](#).

The improvements in in OSA 8 and those expected for OSA 9 were presented. While the impressive imaging improvements are essentially ready, the OSA 9 release schedule also depends on the availability of the improved ISGRI energy calibration. JW proposed to release an updated OSA before the AO release (mid March), even if it did not contain the energy calibration. After some discussion IUG followed this proposal, recommending an early release followed potentially by OSA 9.1 a few months later (Recommendation 27).

Reprocessed data expected to be ready by Feb/March 2010. Results (spectra, lightcurves) for individual sources will be made available via [www.isdc.unige.ch/isdcvo](http://www.isdc.unige.ch/isdcvo).

## 7.1 Data rights, public data – RW

RW raised the question when data from a given observation should become public. In the past data were distributed to the PI in larger blocks, spanning often multiple revolutions. Nowadays data is distributed automatically revolution by revolution. This leads to three options:

- A One year after the data from a given revolution has been distributed, these data become public.
- B Data become public one year after completion of a significant part of a proposal, typically after each visibility period.
- C Data become public one year after the distribution of the last data set taken for this observation.

Case B is more or less the solution currently described in the AO documentation. After some discussion IUG recommended to implement case A (Recommendation 28).

## 7.2 Use of proprietary data at ISDC

JW explained that while the QLA and announcement of new transients is an essential task at ISDC, there have been bad feelings in community about follow-up observations triggered by scientists at ISDC. There is a perception of an unfair advantage of the ISDC scientists.

RW explained the procedure for ATEL publication which is always coordinated with the PI and includes CoIs. No ATEL is published against the wish of the observation's PI.

The issue was discussed at some length, leading to a recommendation that ISDC scientists should exercise restraint when acting on knowledge from their QLA work.

# 8 Mission Extension

## 8.1 ESA Status of preparations

CW presented his view of the extension case (see [viewgraphs](#)). The budget has been approved up to end 2012 with a mid-term review in Oct 2010. The request in fall 2010 should contain the science case, the technical status report and a budget request for 2013/2014.

The yearly budget is ~1% of the cost of the mission, giving a ~15% gain (1/7) on future science.

The emphasis should be on science return from future observations, taking into account the comments from the advisory bodies to the earlier presentations. A very strong science case will be required. CW will prepare this together with the "godfathers" on science topics, other members of IUG and members of the community.

The proposed breakdown of the presentation was presented. A written science case, limited to 6 pages, will be submitted to AWG/SSAC/SSWEG for evaluation, prior to the AWG meeting. The AWG will receive brief presentations from PS/MM.

The expected timeline of activities was shown, PK added that another MEOR will take place 30 June / 1 July at ESOC. The preparations will be a main topic for the IOCG meeting of 23 February.

## 8.2 US Senior Review

ML discussed the upcoming US Senior Review (see [viewgraphs](#)). The panel will meet end of March. Proposals are due in early February, draft proposal are due tomorrow.

## 8.3 Scientific topics

### 8.3.1 Galactic sources

TB presented the case of galactic compact objects (see [viewgraphs](#)). INTEGRAL is currently accompanied by RXTE and Swift, but the former will probably stop operating in 2010. Even RXTE were extended it will have to de-orbit in 2012.

The Indian satellite ASTROSAT is to be launched late 2010, early 2011. It will contain very large proportional counter going up to  $\sim 100$  keV. The big drawback is that only in its third and fourth year some AO time (10%, 20%) will be open to the world. But probably good opportunities for collaboration exist.

For synergy with Fermi the INTEGRAL energy band is strongly required. NuSTAR (Aug 2011) is a very nice mission, but limited to  $< 80$  keV, which is bad for BH studies. The Japanese ASTRO-H (2013) will be complementary. Other instruments mentioned were the Fermi GBM and LOFAR for radio monitoring.

TB considers that long TOO observations (Msec) should be possible to make best use of INTEGRAL, e.g., to measure the hard tails of compact objects.

### 8.3.2 Galactic centre

AG summarized some new interesting results on the Galactic Centre (see [viewgraphs](#)).

### 8.3.3 Nucleosynthesis

RD presented an update of the status of Nucleosynthesis research (see [viewgraphs](#)).

The upcoming NuSTAR mission will be great to map  $^{44}\text{Ti}$  emission in Cas A and a few others clear candidates. But its spectral resolution will be less good and it only can do this line.

### 8.3.4 Extragalactic sources

PU described work done on extragalactic sources (see [viewgraphs](#)).

Hard X-ray observations are essential to find heavily obscured sources required to explain the XRB. The data show a trend to fewer absorbed sources for increased  $z$ , which may be a luminosity effect. Deeper surveys are required to have a more complete sample.

### 8.3.5 Gamma-Ray Bursts

See [viewgraphs](#).

INTEGRAL has observed a less luminous population since it has a factor 2–4 better sensitivity to weak GRBs than any other mission. In addition there is the possibility to measure polarization.

A possible population of low-luminosity / long-lag close GRB (12 out of 60 bursts) has been found.

New software has been developed at Southampton which largely improves the sensitivity to weak bursts. It is run on archival data, but could probably be implemented as part of the NRT processing.

## 9 Brainstorming: future science

JW encouraged the IUG members to think out of the box for future INTEGRAL science topics. Various topics were brought up in the discussion:

- Multi-messenger astronomy, e.g., neutrinos from blazar flares.
- HESS/CTA source follow-up. The INTEGRAL results on HESS sources seem to be ignored, a fault of lacking modeling?
- Polarization measurements and Compton mode on PWN and GRB.
- SFXTs, winds around massive stars.
- Extremely absorbed X-ray binaries: population, why do they all seem to be neutron stars with mid-to-long periods? So far no cyclotron lines found. When are the transient systems active?
- Follow-up on eROSITA with INTEGRAL.
- High-energy tails of SGRs. SGR follow-up and magnetar science in general.
- High-energy tails of BHCs.
- Dark matter distribution, positrons, ...

Up to now, the new AO scheme with data rights has not attracted a larger community. Some groups have large fractions of the sources – should there be a limit?

The “godfathers” should contact other scientists (e.g., M. Revnivtsev) for further ideas and submit sections for the science case. A draft document will be circulated within IUG. JW asks for blunt comments from the members.

## 10 Integral WS Dublin 2010

The first announcement has been circulated, otherwise there are no major news at the moment.

## **11 Integral WS 2012**

AG proposes to have the 2012 INTEGRAL Workshop in Paris during the week of the 10<sup>th</sup> birthday. They expect 200-250 attendants.

CW noted the “unwritten rule” to cover all countries contributing to the mission – e.g., Poland, Czech Republic, Netherlands, USA.

To be discussed further at the next IUG meeting.

## **12 Next Meeting**

To be held at ESTEC, mid May to mid June (Doodle). It will probably be 1.5 days, starting at 10:00 on the first day.

**Action 08-5 on JW**

*Set up Doodle poll for date of next IUG meeting*

**Due: early 2010**



## Appendix: IUG Recommendations

### **Recommendation 24: Multi-Year Key Programs**

*IUG encourages multi-year key programs, with observations spanning two AOs. In the first year of such a key program, a normal 5 page long justification for a key program is to be submitted. This justification should describe the science case and technical feasibility for the total observing time requested. In the following AO, this initial proposal is to be followed up by a “confirmation proposal” of up to two pages in length, in which the timeliness of the science context of the original proposal is to be discussed in light of the scientific progress since its submission. Where possible, the feasibility of the original proposal should be updated based on the already taken data. During the subsequent AO, TAC is to be provided with the original proposal from the previous AO.*

### **Recommendation 25: Scientific Proposal Evaluation**

*IUG recommends that in the scientific evaluation of an observing proposal the overall science return to the mission is to be taken into account. Proposers should thus strive for maximum use of all instruments, and take the archival value of the data into account. Note that this might imply the use of JEM-X as the main instrument, if TAC deems this sufficiently well justified.*

### **Recommendation 26: Calibration Observations**

*IUG recommends that in AO7 in addition to the three planned revolutions one further revolution is to be set aside for calibration observations of the Crab.*

### **Recommendation 27: OSA Release**

*IUG recommends that ISDC release OSA 9 before the AO release (mid March 2010), even if the improved energy calibration is not ready. In the latter case IUG recommends an intermediate release of OSA (“OSA 9.1”) as soon as the revised energy calibration is available.*

### **Recommendation 28: Data Releases**

*IUG recommends that data from a revolution become public one year after the data from that revolution have been distributed.*