THE INTEGRAL SCIENCE OPERATIONS CENTRE

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ABSTRACT

The Integral Science Operations Centre at ESTEC is responsible for support to the community in the issue of the Announcements of Opportunity, support for the Time Allocation Committe and Mission Planning. In the paper we discuss the aspects of the ISOC which are of interest to the community, namely; - the role of the ISOC in the overall ground segment;- the ISOC data archive; - the observation scheduling procedures and policies.

KEYWORDS: operations

1. INTRODUCTION

The Integral Science Operations Centre (ISOC) is maintained by the European Space Agency and is located at ESTEC, the Netherlands. Together with the Integral Science Data Centre (at Versoix, Switzerland; see Courvoisier et al, 1999) it forms the Science Ground Segment for the Integral Observatory. ISOC is concerned mainly with the *uplink* chain of Integral scientific operations; the Calls for Proposals, support to the Time Allocation Committee, generation of the scientific observing schedules, general community support in these areas.

2. CALLS FOR PROPOSALS

Approximately 2/3 of Integral observing time is open to the general community, the remaining 1/3 being dedicated to a 'Core Programme' of guaranteed time (see Winkler et al, 1999). ESA will solicit observing proposals from the community for evaluation by the Time Allocation Committee (TAC), and the recommended proposals will form the Open Time part of the observing programme. There will be one Call pre-launch, and post-launch about one Call per year (TBC).

ISOC will prepare and issue the documentation associated with the Call, and also make available various software tools to assist in proposal preparation; Observing Time Estimators (OTES) for the various instruments, sky visibility calculators, and especially the Proposal Generation Tool (PGT). PGT will enable observers to prepare and electronically submit their proposals in response to the Call. In fact, the *only* way a proposal will be processed by ISOC is if it has been submitted through PGT.

Once the proposal submission deadline has passed, ISOC will perform a *technical* assessment of the proposals and report to TAC, who then perform a *scientific* assessment. Finally, successful proposals and their associated observations will be processed by ISOC into a Mission Data Base in readiness for scheduling.

3. OBSERVATION SCHEDULING

All scientific observations performed by Integral are pre-planned by ISOC and submitted to the Mission Operations Centre (MOC; see Schmidt et al, 1999) at ESOC. Scientific scheduling is usually performed about 3 - 5 weeks in advance of execution, but with faster (hours) response times for Targets of Opportunity.

About 66 hours of the Integral orbit occurs above the van Allen Belts and in principle can be used for scientific observations. However there are some outages - Ground Station handover, eclipses - which cannot be so used and ISOC scheduling must respect these, as well as the celestial viewing constraints of the spacecraft. Within these restrictions, scheduling is a trade-off between:

- observing efficiency (maximum time spent collecting useful data);
- optimised scientific return (respecting scientific grades allocated by the TAC);
- individual requirements (fixed-time or coordinated observations).

Extensive software development is under way at ISOC in building tools to assist ISOC schedulers in best performing this trade-off during operations

4. TARGETS OF OPPORTUNITY

From the viewpoint of ISOC, there are two kinds of ToOs;

- previously known candidates, e.g. Cygnus X-1 in high state. They are included in either the Core Programme (CP) or Open Time (OT) proposals. The Integral Science Working Team (for CP) or TAC (for OT) will recommend guidelines on how to react to these ToO alerts
- genuinely new objects, discovered either in Integral observations or by other spacecraft or observatories. In this case the Project Scientist (in liasion with the TAC chairman, if time allows) will take the final decision as to the response to such ToO requests.

In either case, ISOC have the capability to respond rapidly (within a few hours) via fast replanning.

5. THE OBSERVATION TIME ESTIMATOR (OTES) AND INSTRUMENT PERFORMANCE VALIDATOR (IPV)

These products form a dedicated system being developed for ISOC by the University of Southampton. They have a common base in the Integral Mass Model (see Lei at al, 1999). However, their functionality is different to the other simulators being developed for the overall ground segment.

The OTES is used in support of observing proposal assessment as described in section 2 above. Observation durations calculated by OTES are the 'official' ones used for TAC decisions and in the actual planning of observations.

The IPV is used in-house in the ISOC to study the effects of any changes to individual instrument settings on the payload performance as a whole.

6. THE ISOC ARCHIVE

ISOC will maintain a mirror of the scientific data products archived by ISDC. In the nominal case there is no access to the ISOC archive from outside and *any queries or retrieval requests should go directly to the ISDC.* However, if the ISDC archive is off-line for an extended period, the ISOC archive can be opened for public data distribution. *This would only be done at the request of the Project Scientist, and after liasion with ISDC.*

The purposes of the ISOC archive copy are:

- to avoid the necessity of setting up an entire new archive system in the post-operational phase, while fulfilling ESA's obligations on long-term archiving;
- to provide a backup to ISDC, as described above;
- to help in the technical assessment of new proposals by ISOC;
- for general *operational* support.

REFERENCES

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