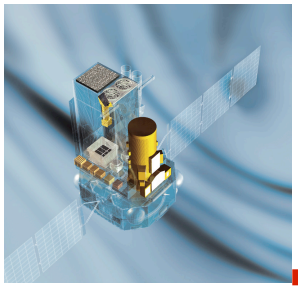
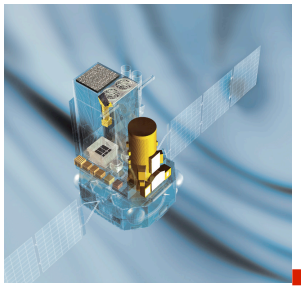


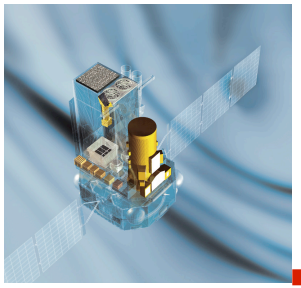
US *INTEGRAL* Program

Previous Senior Review Proposal Strategies



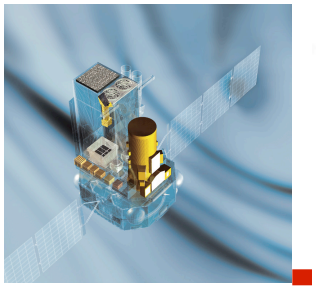
SR04:Proposal Strategy

- By spring 2004, some US GOs had data, but
  - IBIS & JEM-X Software & calibration issues
  - Archive not yet opened (ISDC or NASA)
- Thus, emphasis placed on future GO science, &
- Core science program was predominant theme
- Science presentation:
  - emphasis on 511-keV map
  - Galactic plane survey
  - "Hidden" X-ray binary population
  - Galactic ridge



SR04: Committee Response

- During presentation criticisms focused on:
  - Budgetary & management plan issues
  - Lack of US authorship on early papers
- Written evaluation criticized:
  - Software usability & data accessibility
  - Key results were incremental rather than breakthrough science
  - Level of US participation
- **Bottom line:** zero out program in 2 years unless compelling case made in SR06



Excerpt:

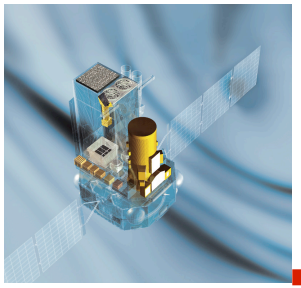
SR04 Evaluation

Data accessibility:
INTEGRAL data are accessible from the GOF and HEASARC, but analysis software is relatively difficult to use even for groups with prior experience with analysis of gamma-ray data. Additional software tools are needed, and further development of the offline analysis system (OSA) is encouraged. It is particularly important that the INTEGRAL data be ingested into the HEASARC archive.

Proposal weakness(es):
The science case presented in the proposal was not as compelling as it could be and does not adequately reflect the potential of INTEGRAL in future years. The science return thus far from INTEGRAL has been primarily limited to early results on sources previously known (e.g. 511 keV and 1809 keV diffuse emission) or probably already detected with Chandra (e.g. the highly absorbed hard sources in the galactic bulge). The Panel recognizes that INTEGRAL observation times will typically be long to achieve the sensitivities needed for new discoveries. Detection of the galactic nucleus (SgrA*), if confirmed, would be an exciting example.

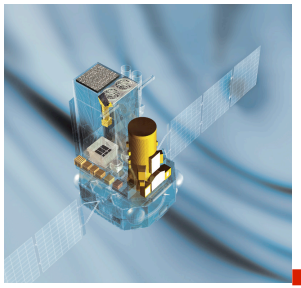
Overall assessment and recommendations:
The Panel was concerned by the relatively small number (~25) of US PI programs in the AO1 and AO2 programs and encourages the GOF to improve software and analysis tools to make INTEGRAL data more readily accessible. The small over-subscription factor in proposals vs. in time requested suggests that the user community is (still) limited.

The Panel recommends funding at the in guide level for FY05 and FY06 but does not support the request for a theory or archival program. The Panel challenges the GOF to further improve data analysis software and ease of access to archival data. Continued GI funding beyond FY06 vs. support only for ingesting data into the HEASARC should be dependent on this.



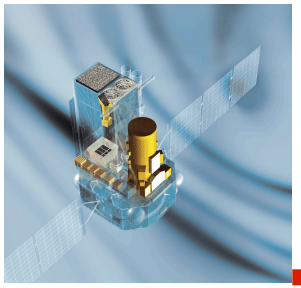
SR06: Mission Extensions

- Senior Review Mission Extension Paradigm for missions beyond prime mission:
  - Bare-bones mission operation and science operations
  - Bare-bones data handling
  - Minimal funded science data analysis
  - GI grants (mission, ADP and ATP) should be used to support science utilization of data



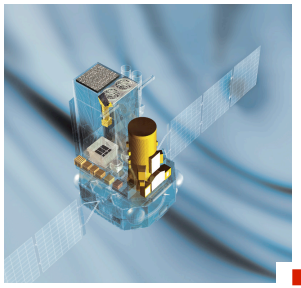
SR06: Proposal Strategy

- Emphasis on:
  - Science highlights → *tie-ins to GI program*
  - Efforts to facilitate broader participation
    - AAS special session
    - GI workshop
    - Archive/theory program
  - Software & calibration improvements
  - Opening of US archive
  - Cross-mission synergies
  - Streamlined management plan

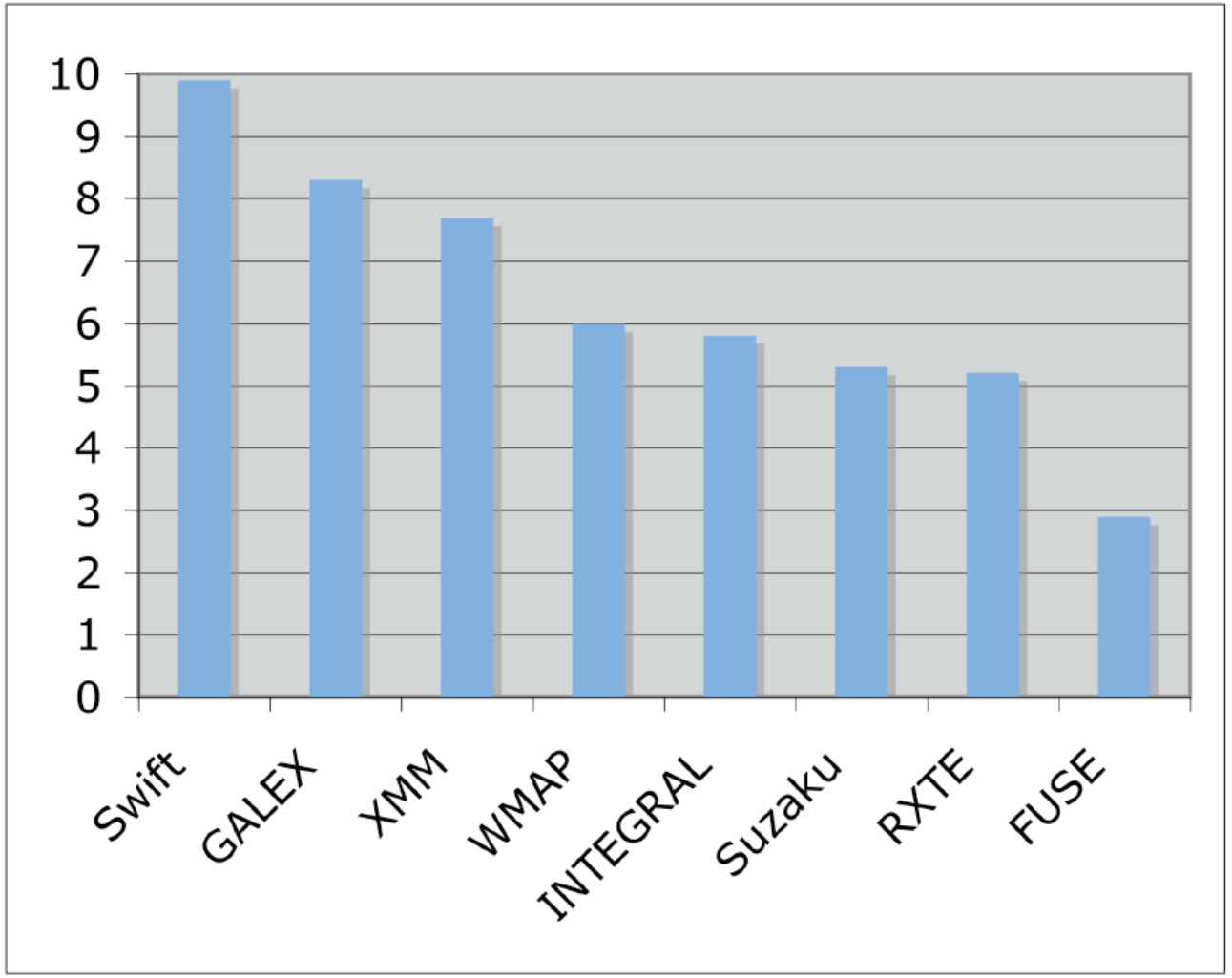


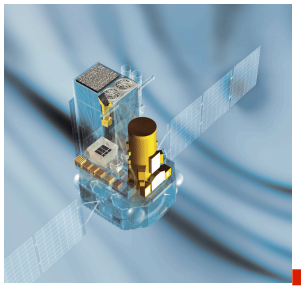
SR06: Budget Strategies

- Trimmed total costs by ~40% through:
  - 2 FTE reduction at GSFC GOF
  - Ramp down of Co-I activities @ GSFC, MSFC, UCSB & UCB
- Argued strongly for maintaining flat (or slightly increasing) GI grants pool
  - Key projects program was anticipated to expand US participation
- Strategy was successful: INTEGRAL ranked 5th out of 8 in SR06 "science per dollar" metric



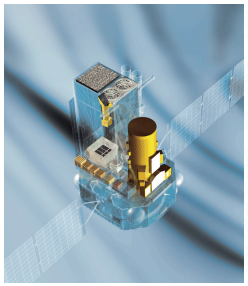
SR06: Results





SR06 Committee Feedback

- During presentation:
  - No budgetary or management questions
  - Science questions, but basically softballs
  - A few lingering concerns on SW usability & calibrations issues
- Written evaluation:
  - Moderate in tone
  - Software improvements, while notable, should continue



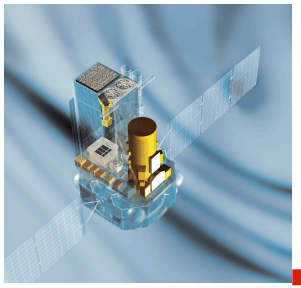
Science strengths:
INTEGRAL has produced important new results on maps of the 0.511 MeV positron annihilation line and the 1.809 ^{26}Al line, and has detected the 67.8 keV ^{44}Ti line and the 1.173, 1.133 MeV ^{60}Fe lines. These observations have fundamental importance by tracing nucleosynthesis from stellar explosions throughout the Galaxy. They have discovered a large number of new Galactic X-ray transients as well as obscured X-ray pulsars, and produced new results on SGRs, SNRs, and GRBs. It is the only mission now and in the foreseeable future that provides information on the nuclear gamma-ray sky. One of its key projects is to provide uniform deep exposure of the Galactic plane.

Relevancy strengths:
INTEGRAL observations are directly relevant to the Lifecycles of Matter goals of NASA's original Structure and Evolution of the Universe roadmap as well as current Astrophysics Division science objectives.

Data accessibility:
The early data analysis software was difficult to use, but the more recent software releases from the INTEGRAL-GOF at GSFC provide better usability. This answers one of the recommendations of the 2004 Senior Review. INTEGRAL has useful synergy with many other missions. INTEGRAL is the only mission in the foreseeable future to provide sensitive coverage in the nuclear gamma-ray line region of the electromagnetic spectrum.

Proposal weaknesses:
INTEGRAL's data analysis software was very user-unfriendly at the beginning of the mission, slowing the output of results. The proposal did not make clear what further steps could be taken to improve data access and ease of analysis. The number of proposals in AO4 was fewer than in AO3, even though time-oversubscription has increased. Outreach to larger community needs to be improved.

Overall assessment and recommendations:
Because of the uniqueness of the data set and the access of US scientists to a mission where the bulk of the costs are borne by ESA, the Panel recommends supporting this proposal at the in-guide level for FY07-08. The Panel also recommends funding at somewhat below the in-guide level in FY09-10, provided that the mission is extended by ESA.



SR08: What to Expect

- No two SR committees are alike!
  - Feisty in the morning, drowsy in the afternoon? Or opposite?
- Be prepared for a broad range of questions
  - e.g. a members pet science topic, FTE justifications, philosophical "science per dollar …" discussions …
  - Comparisons to other missions (need clarifications)
  - Persistent theme: confusion over nature of Core & Open Programs (plays into US-participation metrics)
  - Raw numbers (γ-ray observations take ~10X longer…)