

Report of the Spitzer Science Users Panel - SUP 18

Overview

The Spitzer Science Users Panel (SUP) met Nov 29-30, 2006 at the Spitzer Science Center. As usual the sentiments brought to the meeting by committee members polling their constituents, as well as the general spirit of the presentations at the meeting, were strongly positive. The committee continues to be impressed with the SSC's performance and the resulting community satisfaction. Customer complaints are few and far between and are usually prefaced with, "I hate to complain because I understand how difficult it may be to do this, but...." The SSC's workshops and scientific meetings continue to be highly praised by participants. Interest in the Spitzer Fellows program is expanding indicating the growth of an informed and motivated youthful user community. On the technical level, the switch to "B-side" electronics and associated safing event were handled efficiently and transparently from the user's perspective. Exhaustion of cryogen is now on the horizon and this event's implications are apparent in the SSC's short term planning for the final "cold" proposal cycles (including the upcoming Cycle 4) and long term planning evaluating both the prospects for a "warm" extended mission for IRAC's bands 1 and 2 and the long term specification for the Spitzer archive.

Specific issues:

Personnel

As with any large project in the later stages, key staff with substantial expertise and corporate knowledge are being hired by other projects that are in their own formative stages. Recent departures from the SSC leave the staff, and the instrument teams in particular, thin. The recent cluster of departures reported at the meeting may simply be a coincidence of timing in the otherwise stochastic process. In addition, the SSC has received solid response to advertisements to fill these vacant positions and the applicant pool is strong. Given that users will continue to depend on ongoing instrument characterization and post-BCD tool development into the post-cryogen era, the SUP hopes that the SSC will examine the incentives it may have at its disposal to maintain its core expertise. Retention is now a more important issue given that a potential period of extended operations is under consideration. Much of Spitzer's scientific legacy will be built from extensive use of the archive in the post-cryogen era. Access to corporate expertise will remain important for some time.

Despite the loss of key personnel, the SUP acknowledges that many of these people remain within the greater IPAC umbrella, making quick access to them possible. We encourage the IPAC/SSC management to continue to foster an environment in which these experts can be called upon if circumstances require their expertise.

MIPS pipeline

The SUP notes that the science community may have the impression that the MIPS pipeline maintained by the University of Arizona produces superior results to any publicly accessible products. This sense is fostered in part by the problem with 24um data for bright sources. We note that the IST working together with the Arizona team identified this problem and that it has recently been fixed in the SSC pipeline. We also note that data products for 24um produced by the two teams are nearly indistinguishable, and we encourage both groups to maintain their strong and successful collaboration.

There is further concern for the germanium pipeline products. It is certainly true that the SSC products are extremely robust considering the historical difficulties associated with these devices. One of the primary reasons that the products produced by the Arizona team and the SSC pipeline products differ is that regardless of improvements made to the existing MIPS SSC pipeline, it will always be necessary to tune the pipeline for the "average data set" and will not be able to handle many specialized cases (such as photometry mode observations of a bright, extended source). Most of the products emanating from Arizona have been processed in ways not practical to implement in a generic pipeline.

Fortunately, the SSC makes available the contributed software package called the GeRT, which is currently the only publicly available software package that can process the MIPS Ge:Ga array data to high fidelity for specialized circumstances. Unfortunately, the SUP notes that the primary scientist involved with the GeRT has migrated to another project within IPAC. With this departure, the SUP is concerned that support for this software could languish. This is especially important if new calibrations or reduction methods are implemented in the main SSC MIPS pipeline. Because the GeRT is essentially an off-line version of the SSC pipeline, its efficacy is tied directly to the main SSC pipeline. The SUP encourages the SSC to actively support this important software.

The SUP suggests that one way to dispel misunderstandings about the MIPS pipeline within the user community is to implement our suggestion from SUP 17 (3a), that an anomaly/tips/Data-caveats page be published that allows

users to quickly glean an understanding of the issues involved with MIPS data reduction. The Handbook contains the information, and the pipeline description pages are also helpful, but a "What you must know about MIPS data" page would, in our opinion, head off future confusion within the community about MIPS data. This page would clearly illustrate the fidelity of the SSC products, and the cases where additional processing by, e.g., the GeRT, will dramatically improve the results. The papers on MIPS calibration and processing that were jointly prepared by the Arizona and SSC teams should be linked directly from this page. The last question on the MIPS FAQ could also be revised to point the user to the "caveats page," and the FAQ itself could address some the issues directly without redirection to the Handbook.

We note that, subsequent to the SUP 18 meeting which is the subject of this report, the IRAC and MIPS IST have issued just such pages:

<http://ssc.spitzer.caltech.edu/irac/features.html>

<http://ssc.spitzer.caltech.edu/mips/features.html>

In summary, the SUP acknowledges the outstanding achievements made by the SSC in providing imminently usable data for MIPS. We also acknowledge that the user community must themselves take some responsibility for tuning these products to their own requirements with the help of the SSC and products such as the GeRT.

The SUP also eagerly acknowledges the newly implemented 160um faint-source photometry mode. We support its vigorous characterization and calibration.

The MIPS SED mode appears to be garnering more attention by the user community. We urge that more information about this mode, its use and calibration be disseminated to the community. In particular, more details about the extraction and calibration (including graphs demonstrating current photometric and wavelength calibration) would benefit the community.

APEX source extraction

The APEX source extraction tool has been available to the Spitzer users community for some time. It was the availability of this tool, in part, that spurred an earlier effort by the SUP to urge the SSC to include source extraction as a standard part of pipeline processing. As earlier SUP reports document, the SSC made strong arguments that delivering sources could mar the reputation of Spitzer data overall

given the high level of catalog completeness and reliability presumed by users. This level of validation and certification of extracted sources would place prohibitive loads on the SSC staff. At its last meeting the SUP endorsed this position of the SSC but requested that the APEX tool be characterized to the point that users could perform their own source extractions with some confidence in the performance of APEX. At this meeting of the SUP the SSC delivered some initial characterizations of APEX. This characterization was largely a "first-look" at APEX performance and demonstrated that the code is functional to first order. Bringing APEX into agreement with results from more established source extraction software required some manipulations of the backgrounds and other extraction parameters. More than once during the APEX validation presentation the SUP heard, "We need to fix this...". While it is understood that these initial validations will lead to modifications in the APEX tool, APEX has been in the public domain for over two years and the discussion at the SUP meeting indicates that users may be placing more confidence in the extractions than appropriate. The SSC should post the results of validations they have done to date so users can understand the current limitations and biases. The APEX documentation site should contain an admonition warning users that the package has yet to be fully validated and should be used with caution. Most importantly, the SUP expects the SSC to continue the evaluation and validation of APEX with more detailed characterizations to be presented at the next SUP meeting. We note, in the context of the personnel issues expressed above, that Dave Shupe, an APEX expert, is leaving the employment of the SSC. In general, documentation for APEX should be expanded and fiducial sample datasets should be provided so that users can validate their own use of the APEX tool.

IRS, SMART, and SPICE

The SUP has viewed SPICE (SSC post-BCD IRS spectral extraction tool) and SMART (Cornell instrument team post-BCD IRS spectral extraction tool) as complementary tools, ideally used in tandem. The user community has (so far) seen these two tools as mutually exclusive. Many of the SUP's earlier recommendations in this area have been towards encouraging a more unified user view of these complementary tools. In the meantime development, maintenance, and on-line documentation has diverged over time. The SSC is adding capability (e.g. optimal source extraction) to SPICE and Cornell is more independently supporting SMART locally. The SSC should continue to enlighten users to the differences between SMART and SPICE and inform them of the ways they could be used in tandem. More guidance should be provided than is typical of contributed software at the SSC

website. SSC should encourage the SMART team at Cornell to maintain calibration files and keep those calibration files up to date.

IRAC PRFs:

The SUP acknowledges the significant progress being made to characterize and provide PRFs for the IRAC instrument. The development of the extended PRF using the diffraction wings of saturated sources grafted onto the central PSFs of unsaturated sources is also compelling. We strongly support all initiatives that will provide these PRFs to the user community, and the possible development of a user tool similar to STinyTIM that will produce model PRFs across the entire array in all observing modes. As this process develops, the SUP encourages the IRAC IST to disseminate as much information to the community as possible, through the email forums and the SSC website.

Archive, Long-term Archive Plans, and Source Extraction

The community response to the archive tool Leopard and the archive itself has been exceptionally positive. At this meeting the SUP heard about the start of the specification of the long term configuration of the archive with plans to deliver this specification by October 2007. The SUP is looking forward to reviewing an initial draft of this specification at our next meeting. The legacy value of the archive will hinge, in part, on its smooth integration into the NVO archive environment. The SUP has already heard plans for doing so through IRSA. Utility of the archived data will be greatly enhanced by the availability of extracted sources. As discussed above, the SSC does not consider it wise or feasible to deliver source extractions as part of current pipeline processing. The SUP would like the SSC to include text in its long term archive specification that addresses the SSC's position on source extraction for Spitzer archival data. The SUP hopes that the SSC will develop a plan to deliver at least high SNR source extractions that can be confidently served along with the other processed archive products.

Current GO Funding Issues:

The SUP has heard pleas from the GO-2 and GO-3 legacy teams for more flexibility in their funding profiles, which currently exclude no-cost extensions. The GO-2 and GO-3 legacy teams have expressed their concern that the standard three year window is not sufficient in many

cases to fulfill their delivery obligations and science goals. The SUP strongly urges the SSC to explore the possibility of granting one year no-cost extensions to GO-2, GO-3 and now GO-4 legacy programs.

Warm Mission and Transition from Cryo Era

The SUP was pleased to hear extensive and well-considered reports on initial planning for final stages of the cryogenic Spitzer mission and the warm extended mission that may follow.

The cold/warm transition is a management challenge given the one month (and possibly greater) uncertainty in the date for the final exhaustion of cryogen .

GO/archive funding:

The SSC should have a clear and flexible plan for administering GO funding during the transition from the cold mission to the warm/archive era that maximizes the scientific productivity of GO's. Given that the end of the cryogenic mission can be uncertain at the few month level, the allocation of support between GO and archive and the strategy for administering that funding must have the flexibility to address early/late exhaustion of the cryogen.

Cycle 4/5 planning:

The SUP was impressed with the level of consideration given to the Cycle 4/5 proposal review process and the complexities in program selection introduced by the exhaustion of cryogens and subsequent warm mission. At the meeting the SSC reported that it plans to advise review committees that a "best science regardless of instrument" criterion should guide selection for the next two proposal review cycles instead of one that emphasizes the use of the instruments available only during the remaining cryogenic time. Given that that IRAC Band 3/4, IRS, and MIPS capabilities will not again be available for some time - possibly indefinitely - and given the increasing level of confidence that there will be some form of an extended mission exploiting the continued availability of IRAC Bands 1 and 2, the SUP urges the SSC to give further consideration to advising reviewers to place less emphasis on proposals dependent only on IRAC Bands 1 and 2 in cycles 4 and 5. Reviewers for Cycles 4 and 5 should also be given explicit guidance on the capabilities/limitations of AKARI, WISE, and other missions so that they may select proposals that do not duplicate results provided by these other assets (or conversely unfairly criticize proposals because of misunderstandings of the capabilities of these other missions).

The SUP was also concerned by the statement that a large percentage of observing priority in the final mission would be given to large programs. The percentage allocations for top priority discussed by the SSC seemed to be too restrictive to the small programs. We acknowledge that the large programs are vetted by two review panels, and therefore possibly receive more scrutiny than smaller programs, but we are also concerned that large programs could be favored over smaller programs that would otherwise broaden the overall scope of the Spitzer legacy. We urge the SSC to solicit additional community advice on this issue.

Other long term issues:

The SSC should clarify GTO involvement in and support for the post-cryogenic mission as well post-cryogenic archival analysis support for GTO's.

For cycle 5 the SSC should advertise that for "outstanding science opportunities" it will entertain capabilities outside the standard AOR's through Instrument Engineering Requests (IER).

Public Affairs

The SUP continues to be astounded by the effective and creative efforts of the Spitzer Public Affairs group. The chemistry of this particular small group of individuals is outstanding and their combined efforts have advertised Spitzer's capabilities and discoveries to the public most effectively. The team's creativity lies not just in the primary products they generate but in their exploitation of the modern-day "cultural technologies" such as podcasts and YouTube. One area of frustration discussed at the meeting concerns the inability of that group to produce something as simple as posters and bookmarks for distribution to school children due to NASA/JPL regulatory bureaucracy on the distribution of public products. While the SUP understands the primary need for such regulation, its implementation appears unnecessarily stifling. The Public Affairs group has done a heroic job of working within the formal NASA constraints, but it seems a shame that they can not readily produce items such as wall posters for children that could serve as constant inspiration as well as reminders of the rewards of scientific exploration and investment. The SUP encourages the SSC and IPAC management to push hard for relaxation of this counterproductive policy. The SUP is happy to advocate for such a change.

Advertising TAC membership

The SSC should publish TAC membership each cycle following the announcement of proposal time allocation results. Panel membership should be published retroactively back to Cycle 1. [The SSC responded to this issue immediately following the SUP meeting and TAC membership is now available at the SSC website.]