Spitzer Science Users' Panel #15 Committee Report (March 31/April 1, 2005)

1. General Comments

   As Cycle 1 observations draw to a close the SUP finds the SSC
   organization impressively able to manage the various aspects of user
   interaction from proposal processing, scheduling, and data acquisition
   through to broad dissemination of data products to the community. The
   concerns expressed at SUP14 have largely been addressed and users of
   the observatory are consistently receiving data ripe for scientific
   analysis while the observatory itself operates at peak efficiency.
   Given the limited resources available, our assessment of the SSC
   staff's achievement remains "heroic" and we hope that members of the
   user's community will take time to express their appreciation for this
   level of commitment and for the high quality data products emerging
   from SSC when the opportunities arise. Many of the concerns raised at
   SUP14 derived from the transient response to the start of observatory
   operations and user support, as well as the first exposure to the
   idiosyncrasies of the data and the data pipelines. At this meeting
   there was a noticeable transition from putting out fires toward
   methodical improvement of the BCD data pipelines products and user
   support.

   Scientific productivity is the ultimate metric of the utility of
   the Observatory. Although the committee did not make an in-depth
   assessment of the present scientific output of Spitzer, it could
   not help but be impressed by the range topics being address by the
   Observatory and highlighted in the recent press releases and the
   lunchtime science talks. In particular, the revelation of the
   direct detection of flux from extra-solar planets through precise
   broadband photometry with the IRAC camera demonstrates the
   scientific exploitation of the facility in a mode not imagined at
   launch.

2. The Proposal Process

   This SUP meeting occurs following the completion of the Cycle 2
   proposal process and prior to proposal review and time allocation.
   The SUP was pleased to hear that, thanks to lessons learned, Cycle
   2 proceeded even more smoothly than Cycle 1, which itself was
   fairly efficient and uneventful. Dropping the requirement for
   simultaneous submission of AORs with medium and large proposals has
   been cited by a number of proposers as a significant improvement.
   Small proposers still must submit AORs at the time of proposal.
   Although this procedure represents an extra burden on proposers,
   the benefits to the resource-constrained SSC are positive and SSC

has noted a decrease in technically poor proposals in Cycle 2.
Users are clearly becoming more astute and comfortable with the
technical aspects of operating the instruments and observatory.

Cycle 2 saw an oversubscription rate of 3.3:1 in terms of hours
requested vs. hours available. At first glance this
oversubscription rate may seem low compared with the other great
observatories - HST and Chandra. The committee noted, however,
that the hours available on Spitzer are more than double those on
these other facilities (and in this cycle have increased to 6000
hours from the 3700 hours available in Cycle 1). The science
content per hour may be arguably larger for Spitzer as well, as
much of the foundation science now being pursued with the
observatory yields new results in far shorter exposure times than
is routine on the HST or Chandra. If anything, oversubscription at
the 3:1 rate may be optimal since, when oversubscription reaches
10:1, many meritorious proposals go unsupported and the distinctions
between the top-ranked supported and unsupported proposals is
exceptionally fine.

3. Data Pipelines

The delivery of the S11 software pipeline and its products has
resulted in a significant improvement in BCD data quality, particularly
for the IRS. As SSC continues to improve the pipeline the
committee believes that SSC should advertise the specific pipeline
features being addressed in the pending software development cycle
and rank those improvements by their priorities for implementation.

Specific pipeline issues:

  a) IRS Background subtraction

     Users have requested access to IRS quick-look background
     subtracted spectra. SSC should provide an explicit
     background subtracted frame with BCD products (or an
     independent background frame which users may subtract from
     the raw spectrum image).

  b) IRS Rogue pixels

     The increasing number of rogue pixels in the IRS arrays will
     present problems for users. We encourage the SSC to proceed
     quickly on the planned interpolation tools for their removal.

  c) IRS/SPICE aperture corrections

     Users extracting spectra with SPICE may wish to use apertures

which are not identical to the flux-calibrated aperture
provided with SPICE. SSC should provide aperture corrections
so that users may quickly and consistently calibrate
extractions using various aperture sizes.

   d) Imaging tools and source extraction

   MOPEX, APEX, and BANDMERGE continue to be difficult packages
   for users to implement and operate. The complexities of MOPEX
   are such that even experienced users have had problems with
   source fluxes being affected by the mosaicing process
   (e.g. the SWIRE team's first data delivery). In addition,
   the original expectation that BCD products would contain
   source extractions has yet to be realized. The ability to
   extract sources from Spitzer images continues to be a lagging
   feature of the post-BCD suite, and significant benefits would
   accrue from users being able to consistently extract source
   fluxes with a validated piece of post-BCD software. SSC
   should place some priority on validating all three packages
   and delivering effective and easily operated versions of APEX
   and BANDMERGE during Cycle 2.

   e) Platform dependence of software tools

   The Solaris operating system is rapidly taking a secondary role
   in astronomical computing as departments switch to Linux
   architecture and individuals increasingly use the MacIntosh
   operating system.   To the extent possible, software development
   should take place in a platform-independent environment and
   code now restricted to the Solaris operating system should be
   ported to other operating systems.

4. Reprocessing and Archiving

   Reprocessing plan:

   The reprocessing of the archive data with the S11 pipeline has
   been successfully completed. In response to an earlier SUP
   request, SSC presented a plan to execute subsequent full
   reprocessings only when the pipeline improvements yield
   significant improvement in data quality. Between full
   reprocessings, new data will be processed using the latest
   pipeline version, with incremental reprocessing (e.g. on-demand as
   data is requested from the archive) to be implemented at some
   point in the future. The committee endorsed this approach to
   future reprocessing.

Archive capacity:

At its previous meeting the committee expressed concern that the
archive might become oversubscribed upon its population with a
significant volume of data. At this meeting we were pleased to be
proven wrong. After resolution of the initial issues with the
commissioning of the archive the archive has operated smoothly and
the computing resources have been adequate to satisfy user demand.
The appointment of a new archive scientist, Mark Lacy, addresses
the SUP's earlier concern that there be an individual with
full-time responsibility for archive issues.

Legacy datasets:

As the Legacy projects culminate in the delivery of enhanced data
products one of the primary motivations for the Legacy program is
being realized - the creation of "substantial and coherent
databases of archived observations that can be used by subsequent
Spitzer researchers." Legacy teams have had to balance their
unique scientific access to Spitzer with the demands of producing
documented and validated data products for the Spitzer community.
The latter has been a challenging and time-consuming task. Given
that Legacy work has been as much "service" as it has been
"science," the Legacy teams also deserve significant community
recognition for their efforts. As major Legacy deliveries enter
the archive SSC should advertise their availability and content to
the Spitzer community. Given the success of the Legacy program,
the SUP is eager to hear the outcome of the upcoming mid-term
science review in which the potential for large projects in the
culminating years of Spitzer will be discussed.

GO processed datasets:

The SSC archive currently serves processed data products from the
Legacy teams in addition to BCD data products. Some users have
expressed interest in also providing "value-added" data products
for the SSC archive. In principle, such an augmentation to the
archive is desirable. In practice, SSC has limited resources to
support user-generated datasets. The SUP encourages SSC to
develop a policy for limited archive support of user datasets and
a plan for informing the user community of this opportunity. For
example, the committee discussed the possibility of encouraging
large projects to define modest value-added products as part of
the proposal process.

Availability of formerly proprietary data:

As the one-year anniversary of the opening of the archive

approaches (and thus the public availability of the significant
volume of proprietary data which initially populated the archive)
SSC should draw community attention to the impending availability
and content of these datasets. Data obtained during IOC/SV in
particular may contain some "hidden treasures" and we encourage a
modest effort to document the contents and purpose of these data.

5. Workshops and Community interaction.

At this SUP meeting the SSC staff reported on the results of the
first Spitzer community data workshop. The workshop evaluations
were shared with the committee. All indications are that workshop
was quite successful in educating Spitzer users in hands-on data
reduction techniques. The workshop also provided valuable direct
feedback on users' wants and needs to the SSC staff. This
extremely valuable two-way dialog will continue as SSC plans a
regular data workshop schedule.

The primary significant user complaints
received through workshop feedback (as well as directly to the SUP)
involved the requirement that users appear at the workshop with a
complete computer system capable of running the software tools (and
thus IDL). The notably positive aspect of this requirement is that
users arrive well prepared to discuss data reduction as opposed to
computer configuration. On the other hand, some attendees were
surprised when their systems/preparation prevented their full
participation while other users did not attend the workshop, despite
desiring to do so, because of the computer pre-requisites. Future
workshops should provide some accommodation for a limited number of
attendees who are not able to arrive with the necessary resources
in hand.

Users appear pleased with the data cookbooks and demonstrations.
Additional demonstrations, particularly filling in the gaps in the
existing library (IRAC point source extraction, IRAC ch3/4
mosaicing) will no doubt be welcomed. Now that SMART has become
available for IRS users, and given user interest in this tool, SSC
should develop similar quality support for SMART.

6. General user feedback

The conclusion of the GO-1 cycle provides an opportunity to poll
the users community on their satisfaction with the Spitzer
experience (proposals, scheduling, data products, post-BCD support,
etc). A broad survey sent to all GO-1 investigators could uncover
issues not apparent from the usual feedback channels (e.g. the
email helpdesk). If such a survey is implemented now (mid-2005)

feedback could be incorporated in time to influence GO-3. The SUP
is eager to work with SSC in developing a suite of queries to
evaluate user satisfaction with the goal of implementing any
changes as early as the proposal call for GO-3.

7. Gauging instrument mode productivity

   SSC currently records publications produced with
   Spitzer data. To the extent possible, this record should include
   the primary instrument and instrument modes contributing to the
   publication.   Longer term it may become possible to recognize
   bottlenecks in the throughput from data acquisition to science
   from this empirical measure of system productivity.

8. SSC response to budget reductions

   The SUP examined options for applying anticipated FY05/06 budget
   reductions and concurs with the SSC view that activities associated
   with continued data acquisition and delivery both in the short term
   and through the end of the cryogenic mission should receive highest
   priority as they are essential to the subsequent exploitation of the
   facility by the broader scientific community. Among the remaining
   choices, discussed in turn below, the SUP was hesitant to suggest
   quantitative guidelines. Instead, we report an assessment of relative
   priorities. In all cases, the primary criteria for consideration
   involved the impact on the science yield of Spitzer through the end of
   the cryogenic mission. Under consideration were the following areas:

   1) GO funding

   2) Education and Public Outreach (EPO)

   3) Spitzer Fellows program

   4) Archival analysis program

   5) Theory program

   6) Legacy support

   7) GTO support

   Priorities (in order from lowest to highest)

   EPO: Even though the committee recognizes the fundamental importance
   of Education and Public Outreach, this activity received the lowest

priority in our assessment for two reasons. First, it has the least impact on the scientific yield of the remaining mission, and, second, there is an EPO function within SSC which, although it cannot duplicate the opportunities provided by the current GO EPO component, does provide a conduit through which the excitement of GO results can be conveyed to the general public.

Archive/Theory support: Second lowest priority was assigned, reluctantly, to both the Archival Research and Theory programs. Both programs do provide analysis which can contribute to the exploitation of the observatory in the remaining years of the cyrogenic mission, but have lesser potential than GO observations for doing so. Since both archive analysis and theoretical support can both be viewed as enhancing the science yield of Spitzer during the cryogenic mission by feeding back results to subsequent GO proposals, the SUP cannot distinguish priority between the two categories. For this reason, as well, we cannot support cutting either program completely.

GO/GTO funding: The committee ranked GO and GTO support at equal priority. Both are at the forefront of the scientific exploitation of Spitzer. The SUP notes that the GO support reduction suggested at the SUP meeting ($3M over FY05/06) amounts to a disproportionate burden of the budget reduction being placed on GO's. If feasible, however, the pain of budget reduction should be shared between the GO and GTO communities. Should GO funding be cut, the SSC should examine the possibility of adjusting the calculation used to establish the conversion between assigned hours and financial support as an alternative to an across-the-board percentage reduction in GO funding. During the committee meeting, for example, there was some discussion of no longer funding the smallest proposals (e.g. <10 hours) as one means of reducing costs. Although the committee did not reach any clear conclusion on that issue, there was a strong sentiment that proposers should still be permitted to make small time requests even if the funding policy changes.

The committee believes that the Legacy and Fellows programs should receive the highest priority for continued funding. The Legacy programs are drawing to a close and are facing critical deliveries which represent their ultimate payoff to the astronomical community. Last minute budget reductions are likely to be disproportionately damaging to Legacy teams. The Spitzer Fellows program recruits the best and brightest young astronomers to the Spitzer scientific arena assuring a multiplier effect through high quality use of Spitzer time as well as fostering of a generation of scientists deeply experienced in mid-infrared imaging and spectroscopy.

Spitzer User Panel #15 Report
Synopsis and Responses

John Stauffer
SSC System Scientist

Introductory Statement from SUP

The concerns expressed at SUP14 have largely been addressed and users of the observatory are consistently receiving data ripe for scientific analysis while the observatory itself operates at peak efficiency. Given the limited resources available, our assessment of the SSC staff's achievement remains "heroic" and we hope that members of the user's community will take time to express their appreciation for this level of commitment and for the high quality data products emerging from SSC when the opportunities arise. Many of the concerns raised at SUP14 derived from the transient response to the start of observatory operations and user support, as well as first exposure to the idiosyncrasies of the data and the data pipelines. At this meeting there was a noticeable transition from putting out fires toward methodical improvement of the BCD data pipelines products and user support.

The delivery of the S11 software pipeline and its products has yielded a significant improvement in BCD data quality, particularly for the IRS. As SSC continues to improve the pipeline the committee believes that SSC should advertise the specific pipeline features being addressed in the pending software development cycle as well as the ranking of priorities for implementing those features.

RESPONSE:

We will do this.

IRS Pipeline Issues

IRS Background subtraction :

Users have requested access to IRS quick-look background subtracted spectra. SSC should provide an explicit background subtracted frame with BCD products (or an independent background frame which users may subtract from the raw spectrum image).

RESPONSE

In the S13 pipeline, for low-resolution spectra we plan to implement an automatic removal of the sky by subtraction of the spectrum obtained at the adjacent nod position. For high-resolution spectra, we continue to recommend that the observer Obtain their own "off" spectrum and do their own sky subtraction.

IRS Pipeline Issues

IRS Rogue pixels :

**The increasing number of rogue pixels in the IRS arrays will
present problems for users; we encourage the SSC to proceed
quickly on the planned interpolation tools for their removal.**

RESPONSE

**We will do this.   The current plan is to have this available as part of
our S13 software release (in Fall 2005).**

**We are also likely to change the bias level for the long-high module
(the one most affected by rogue pixels), in order to decrease the number
of badly affected pixels.   This change has been recommended by the
IRS team, but will only be implemented after review and approval by
Spitzer management.**

IRS Pipeline Issues

IRS/SPICE aperture corrections:

**Users extracting spectra with SPICE may wish to use apertures
which are not identical to the flux-calibrated aperture
provided with SPICE. SSC should provide aperture corrections
so that users may quickly and consistently calibrate
extractions from various aperture sizes.**

RESPONSE

**The IRS IST will provide flux conversion tables for a small set
of aperture sizes for use with the low resolution modules (in
particular, a faint source aperture).   These will likely be
available in the S13 software build.**

Responses to SUP Report

Archive capacity:

At its previous meeting the committee expressed concern that the archive might become oversubscribed upon its population with a significant volume of data. At this meeting we were pleased to be proven wrong. After the initial issues with the commissioning of the archive were resolved the archive has operated smoothly and the computing resources have been adequate to satisfy user demand. The appointment of a new archive scientist, Mark Lacy, addresses the SUP's earlier concern that there be an individual with full-time responsibility for archive issues.

RESPONSE: Thanks!

Responses to SUP Report

The SSC archive currently serves processed data products from the Legacy teams in addition to BCD data products. Some users have expressed interest in also providing "value-added" data products for the SSC archive. In principle, such an augmentation to the archive is desirable. In practice, SSC has limited resources to support user-generated datasets. The SUP encourages SSC to develop a policy for limited archive support of user datasets and a plan for informing the user community of this opportunity. For example, the committee discussed the possibility of encouraging large projects to define modest value-added products as part of the proposal process.

RESPONSE:
We will develop a policy clarifying this issue. We expect that we will support a limited capability for "ingesting" enhanced data products from medium and large GO teams. However, the bottom-line will be that the impact on the SSC workload must be minimal.

As the one-year anniversary of the opening of the archive approaches (and thus the public availability of the significant volume of proprietary data which initially populated the archive) SSC should draw community attention to the impending availability and content of these datasets. Data obtained during IOC/SV in particular may contain some "hidden treasures" and we encourage a modest effort to document the contents and purpose of these data.

RESPONSE:

We have put a flashing, bold-font message on the Spitzer homepage, Announcing the impending availability of new archival data.

Most of the IOC/SV observations have been reprocessed and are in the archive (and are public). We do not intend to further document these data – there are too many other higher priority tasks.

The SUP commended the SSC for holding the recent data analysis workshop, but also noted that the primary significant user complaints received through workshop feedback (as well as directly to the SUP) involved the requirement that users appear at the workshop with a complete computer system capable of running the software tools (and thus IDL). The notably positive aspect of this requirement is that users arrive well prepared to discuss data reduction as opposed to computer configuration. On the other hand, some attendees were surprised when their systems/preparation prevented their full participation while other users did not attend the workshop, despite desiring to do so, because of the computer pre-requisites. Future workshops should provide some accommodation for a limited number of attendees who are not able to arrive with the necessary resources in hand.

RESPONSE:

We will do this. However, we also believe that there is considerable benefit to the user of getting all the software on their own laptop – and so we will continue to urge that all attends bring their own laptop if at all possible.

Responses to SUP Report

The conclusion of the GO-1 cycle provides an opportunity to poll
the users community on their satisfaction with the Spitzer
experience (proposals, scheduling, data products, post-BCD support,
etc). A broad survey sent to all GO-1 investigators could uncover
issues not apparent from the usual feedback channels (e.g. the
email helpdesk). If such a survey is implemented now (mid-2005)
feedback could be incorporated. The SUP is eager to work with SSC
in developing a suite of queries to evaluate user satisfaction with the
goal of implementing any changes as early as the proposal call for GO-3.

RESPONSE:

If the SUP provides us with a set of questions to include in the survey, and
guidelines for how to conduct it, we will try to conduct such a survey.
However, the opinion of the SSC Oversight committee was that this survey
was not a good use of the limited resources at the SSC, and our own
preference at this point is not to do the survey.

Responses to SUP Report

SSC currently searches for and records publications produced with
Spitzer data. To the extent possible, this record should include
the primary instrument and instrument modes contributing to the
publication. Longer term it may become possible to recognize
bottlenecks in the throughput from data acquisition to science
from this empirical measure of system productivity.

RESPONSE:

We are implementing software which will tell us this type of detail for archival
usage of Spitzer data, and given the still relatively small number of
published papers with Spitzer data this is probably a better measure of
what the SUP was trying to track than publications (at this time).
Next summer, when a larger body of published papers will be available, we
will try to find an intern to compile statistics of this nature for refereed
papers.

SUP response to SSC budget cuts:

The SUP examined options for applying anticipated FY05/06 budget reductions and concurs with the SSC view that activities associated with continued data acquisition and delivery both in the short term and through the end of the cryogenic mission should receive highest priority as they are essential to the subsequent exploitation of the facility by the broader scientific community. Among the remaining choices, discussed in turn below, the SUP was hesitant to suggest quantitative guidelines.

The SUP placed lowest priority on grant-related EPO funding. Second lowest priority was given to archival and theory funding (with a recommendation not to totally eliminate either). Third lowest to GO/GTO funding. And, highest priority to the legacy team and Spitzer fellowship programs.

7