Overview

The successful launch and commissioning of the Spitzer Observatory marks the beginning of what promises to be a five year mission of discovery. Data are already beginning to flow to the community, and with the opening of the Spitzer archive in mid-May, the energy and imagination of the astronomical community will be engaged in interpreting what appears to be an incredibly rich database. The solicitation of the first General Observer proposals is now complete, and starting in July, astronomers from throughout the world will begin to use Spitzer to carry out a wide range of investigations.

The entire project team and, in particular, the management and staff of the Spitzer Science Center deserve both congratulations for a job superbly done, and gratitude from the community for their efforts to make Spitzer an efficient, working observatory within a very short period of time since launch. Their dedication to the goal of making Spitzer an engine of discovery for the community and a tool for engaging public interest in science is palpable.

The SUP met for 1.5 days to (a) review the status of instrument and pipeline performance; (b) review the GO Cycle 1 proposal submission and review processes, and the readiness of the SSC to accommodate the selected Cycle 1 investigators; (c) evaluate the interaction between Legacy Teams and the SSC; and (d) evaluate the status of the First Look Survey (FLS). The Panel also heard presentations from the SSC staff summarizing early results from the FLS.

Our comments and recommendations follow.

Accelerate Release of FLS Data

We are pleased to note that the FLS observations have now been completed. Initial results based on analysis of a small fraction of the FLS data appear to be enormously exciting. As expected, the requirement to quickly process FLS data has engaged the energies of the SSC staff and resulted in the deeper understanding of instrumental complexities. Analysis of the FLS data has exercised data analysis pipelines and ensured that when Spitzer imaging data are released through the archive, they will be well characterized and reliable. We commend the Director for committing time from his discretionary allocation, and his staff for planning and executing the FLS.

The excitement generated by initial FLS results has whetted the community's appetite for the dataset. The SUP urges that the SSC accelerate the schedule for release of FLS data and make data available prior to the formal opening of the Spitzer archive in mid-May . As soon as data are processed through the already certified IRAC pipeline they should be released. Those processed through the MIPS pipleline should be made available as soon as possible following pipeline review and certification in late-April.

IRS Pipeline

Because of the additional complexity of a spectrograph in comparison to an imager, the development of the IRS data processing pipeline has lagged behind that of the MIPS and IRAC pipelines. At present, only relatively sophisticated and knowledgeable users are able to make full use of the presently available pipeline products; the current BCD products do not yet produce flux-calibrated data. We encourage the SSC to ensure that adequate workforce, drawn from both the IRS Team at Cornell and the IRS IST at the SSC, is deployed to accelerate completion of the IRS pipeline, so that the data products can be used effectively by the General Observer Community. The upgraded pipeline should be available no later than the July initiation of Cycle 1 GO observations, with a goal of having it available at the time of the opening of the archive in May.

Documentation and Cookbooks

SUP review of issues raised in response to the GO Cycle 1 Call for Proposals suggests that preparation of proposals might be made more transparent were the Observation Planning Cookbook and Quick-Star Proposal Submission Guide more widely advertised, perhaps in the Call for Proposals or on the main Spitzer webpage. Moreover, SUP believes that restructuring the observer's manual by making it available in html with a hyperlinked index, and removing technical details unlikely to be of interest to the GO (e.g., description of the instrument firmware in the IRAC chapter) would also be valuable. Hyper-linked 'threads' illustrating frequently used observing strategies are provided by the Chandra X-Ray Center; this is another approach the SSC might consider.

Documentation for data analysis will be critical for new Spitzer users. In addition to the planned Data User's Manuals, the SUP suggests that the Chandra-style `threads' approach – short instructions on how to perform single tasks – would be particularly valuable. The SUP will provide volunteers to give feedback on the Data User's Manuals before they are released with the opening of the Archive.

Archive

Spitzer has generated tremendous interest in the community. To capitalize on that interest, we recommend that the SSC adhere to its current schedule of opening the archive on May 11th. While we understand that there is some reluctance to make the data available to the community while a significant number of data analysis issues remain, we believe the early scientific productivity of Spitzer will be .maximized if these data, or large portions of it, are released on the schedules that have been previously announced to the community.

Archive products

In addition to the BCD products available when the archive opens, the SUP recommends that archive users be provided with supporting information with their retrieved data. These include information about the enhanced Legacy data products and their availability , calibration files for instruments where raw data are provided, and information about future processing improvements (such as the MIPS enhancer).

Spitzer Space Telescope Efficiency Issues

The SUP commends all involved on several steps taken recently to improve the scientific efficiency of Spitzer by reducing the frequency of certain spacecraft calibrations and by increasing the maximum slew rate. Further gains in efficiency would appear to be realizable by decreasing the amount of time spent in instrument calibrations. The SUP encourages the SSC to explore approaches to reduced calibration overhead, but not at the expense of reduced data quality.

Software, Software Exchange and News Groups

The SUP urges that the SSC release source code for pipelines (BCD and post-BCD) to users who request it. Software should be made available on the web, and should be accompanied by caveats indicating that the responsibility for working with the source code lies with the user and not with the SSC. The S/W release should be accompanied by Makefiles or appropriate installation systems for selected systems. The SUP understands that there are certain risks associated with this proposal but believes the advantages are significant. In particular, it will allow users to actually see how the software operates and engage experts in the community in a way that is not possible if the community is excluded. The SUP recognizes that software releases may be impacted by ITAR restrictions.

SUP recommends initiation of a *web page*, maintained by SSC, to which community members can post their own developed software which they would like to make available to the Spitzer community. In analogy to the CXC, we recommend that the SSC provide a web-form to allow individuals to enter required information to potential users. Responsible individuals should periodically check links, and insure that instructions are available and an e-mail address is provided for questions. This same web page could be used to post SSC or Instrument Team software which is under development, but not yet incorporated in reviewed and approved periodic software updates. This would be an option for making the MIPS Enhancer available to the community as soon as possible, rather than waiting for its incorporation into a formally reviewed pipeline release.

Following the example of CXC, we also recommend establishing an e-mail or web-based *discussion group*, managed from the SSC, but which is completely self-supporting. This discussion group would engage members of the GO, Legacy and GTO communities to exchange information regarding instrument and software issues and new approaches to analyzing data.

Because a significant fraction of reduction and analysis software, both community-contributed and SSC-distributed (e.g. SPICE for IRS) requires use of IDL, we urge that the SSC examine mechanisms for supporting or subsidizing IDL licenses at sites where the cost of this package is substantial.

Technical Review of Cycle 1 Proposals

SSC currently plans to have SSC staff provide technical reviews for medium proposals, and technical reviews of small proposals recommended for scheduling by the SSC TAC.

The SUP recommends that the SSC provide a summary of technical issues identified in the review of medium proposals to the TAC Chairs and Panels, so that they can be alerted to 'common concerns' prior to the review, and seek advice from knowledgeable SSC staff during the review process..

Next Proposal Cycle

The GO 1 proposal cycle was viewed as a success by the SUP. SPOT was well-received by the community. There will undoubtedly be modifications to the proposal process, the documentation, and tools .for proposal planning in the next cycle. The SUP hopes that the SSC will discuss potential modifications at a time when the SUP can provide useful input regarding priorities.

One specific recommendation we can make at this time is to improve current documentation and tools for planning observations with IRS and to provide an "IRS Simulator" that would enable observers to simulate instrument performance for different classes of astronomical targets. This new tool should be developed in time to guide proposal preparation in Cycle 2.

SUP in the Post-Launch Era

As Spitzer begins steady-state operations as a community-accessible observatory, its membership and interaction with the SSC should evolve. We recommend that:

(1) The SUP membership evolve to reflect the increasing fraction of time devoted to General Observers. While it will be necessary .for at least the next year to retain our ties to the Legacy and Instrument Teams – they are a source of considerable expertise and experience – a larger fraction of the SUP should be drawn from

General Observers awarded time on Spitzer. Archival Researchers should also be represented on the SUP.

(2) The SSC home page be updated to give clear prominence to "SUP" so that users are aware that there is a panel charged with communicating their interests to the SSC. Contact information for the SUP and/or its members should be provided.

(3) SUP meet twice per year "face-to-face", and twice via telecon between face-to-face meetings. This will allow closer communication with the SSC, as well as early identification of issues that need to be addressed in face-to-face meetings. These meetings will enable the SUP to structure a tight and productive agenda for its face-to-face meetings. We recommend that the first of these telecons be held between May 15 and May 30, following the opening of the archive and the completion of the GO 1 review. One critical discussion topic will be shaping of some aspects of the GO 2 call for proposals. SUP members will be expected to use the archive in preparation for this discussion

(4) Involve SUP members in reviews of importance to the community: pipeline reviews; reviews that affect 'science time' available on Spitzer; instrument calibration reviews. A SUP member (or representative) should be invited to participate in all such key reviews.

(5) Plan discussions at our next meeting to review: (a) efficacy of user support as General Observers begin to make extensive use of the Observatory; (b) pipeline status; (c) archive status and use.

(6) The SUP meetings be planned with the goal of increasing the time for Panel discussion and reflection, and perhaps decreasing the length and detail of the verbal presentations. Summary presentations identifying key issues and with reference to written, posted material might better serve SUP in its efforts to provide considered advice.

News Releases

The SUP reviewed current policy regarding public dissemination of Spitzer results. We regard these policies to be appropriate to 'early days' and encourage close cooperation between members of the community having 'exciting new results', the SSC, and NASA. In the future, we hope that the current tight control on releases from Spitzer might be relaxed in service of allowing a bit more independence for Principal Investigators and their institutions in developing new releases. If the PA team at SSC is diligent, communicative, and prompt in their interactions with Spitzer users, we believe NASA's interests in promoting high impact science releases can be achieved while also preserving the free flow of science from Spitzer users to the general public. We expect SSC to provide reports on interactions with users, NASA HQ and the press as the Observatory enters a more 'relaxed' steady-state mode.

● **The SUP urges that the SSC accelerate the schedule for release of FLS data
and make data available prior to the formal opening of the Spitzer archive in mid-May.**

RESPONSE:

**We assessed the feasibility of releasing the FLS data prior to the May 11 archive
opening, and decided that we could release the IRAC portion of the FLS
about two weeks prior to May 11.   We reprocessed the IRAC campaigns when the
FLS data were taken, using the recently commissioned S9.5 pipeline software.
A draft version of the IRAC data handbook was also completed to accompany the early
release of the FLS.   The IRAC FLS data were made available on April 27.**

**The MIPS pipeline commissioning took place too late to make early release of the MIPS
portion of the FLS data feasible.   We were unable to complete documentation and
reprocessing of the MIPS FLS data by May 11. Those data were released on May 31.**

- We encourage the SSC to ensure that adequate workforce, is deployed to accelerate completion of the IRS pipeline, so that the data products can be used effectively by the GO Community. The upgraded pipeline should be available no later than the July initiation of GO-1 observations, with a goal of having it available when the archive opens in May.

RESPONSE:

While development continues, the IRS pipelines are fully functional.   The BCD pipeline produces 2D spectra corrected for all known instrumental artifacts. The post-BCD pipeline produces flat fielded, wavelength calibrated, and flux calibrated 1D spectra (assuming the target is a point source centered in the slit). A large number of intermediate products are available to all observers. The calibration files and pipeline modules will continue to evolve as we gain experience reducing the data from a variety of types of sources. In addition to the fully-calibrated pipeline products currently available to all observers, the SSC will be making available software tools that provide for additional reductions (e.g. defringing or alternative source extraction from the low-resolution slits). Two of these tools, namely IRSFRINGE and SPICE (Spitzer IRS Custom Extractor) will be available before or simultaneously with the first GO data that enters the archive.   The SPICE tool in particular will allow observers to remove local backgrounds (by extracting a local 1D spectrum) or generate non-standard 1D spectra from complicated, extended sources.

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- We encourage the SSC to ensure that adequate workforce, is deployed to accelerate …

Continued response:

Subsequent to the SUP meeting, we discovered a software bug in the IRS pipeline which caused flux calibration errors up to 25% in some cases. We have fixed the bug, but are now working to rederive calibration data which were affected by this bug. By the time the first GO data are available in the archive, we will be caught up with the reprocessing and recalibration.

In order to insure that we are ready to release the GO1 data on time, we plan to reassign two SSC scientists to the IRS team (at about 50% time each) to help with pipeline and postpipeline analysis and validation. We also are working with the Spitzer project to reallocate funding from outside the SSC to allow us to hire one new staff member for the IRS team.

- **Documentation for data analysis will be critical for new Spitzer users. In addition to the planned Data User's Manuals, the SUP suggests that the Chandra-style `threads' approach – short instructions on how to perform single tasks – would be particularly valuable. The SUP will provide volunteers to give feedback on the Data User's Manuals before they are released with the opening of the Archive.**

- **SUP review of issues raised in response to the GO Cycle 1 Call for Proposals suggests that preparation of proposals might be made more transparent were the Observation Planning Cookbook and Quick-Star Proposal Submission Guide more widely advertised, perhaps in the Call for Proposals or on the main Spitzer webpage. Moreover, SUP believes that restructuring the observer's manual by making it available in html with a hyperlinked index.**

RESPONSE:

We are looking for ways to improve our documentation and better advertise what we have. We will add to the next CP better advertising for the Observation Planning Cookbook, which does indeed have hyperlinked specific observation planning examples (like `threads') with AORs.

IRAC and MIPS data handbooks were made available with the archive opening, and we welcome comments from the SUP on the Handbooks (as well as the Spitzer Observer's Manual!). The IRS data handbook will be released in late July (when the GO1 data start to become available).` Data analysis cookbooks will follow as resources permit.

- **Spitzer has generated tremendous interest in the community. To capitalize on that interest, we recommend that the SSC adhere to its current schedule of opening the archive on May 11th. While we understand that there is some reluctance to make the data available to the community while a significant number of data analysis issues remain, we believe the early scientific productivity of Spitzer will be maximized if these data, or large portions of it, are released on the schedules that have been previously announced to the community.**

RESPONSE:

The archive was opened, as planned, on May 11.

- **In addition to the BCD products available when the archive opens, the SUP recommends that archive users be provided with supporting information with their retrieved data. These include information about the enhanced Legacy data products and their availability, calibration files for instruments where raw data are provided, and information about future processing improvements (such as the MIPS enhancer).**

RESPONSE:

The first Legacy team data products are not due to be delivered to the SSC until September – therefore there will be no "enhanced Legacy data products" when the archive opens.   However, we intend to have a link on the archive home page, which will point to one page summaries of what enhanced products will be delivered by each Legacy team, and on what schedule.   These summaries are being distributed at the Summer '04 AAS meeting, and will be placed on our website shortly after the AAS meeting.   We will also provide a link in the archive which summarizes the expected pipeline enhancements which are planned for each of our major software builds, and the schedule for those efforts.

- **The SUP urges that the SSC release source code for pipelines (BCD and post-BCD) to users who request it. Software should be made available on the web, and should be accompanied by caveats indicating that the responsibility for working with the source code lies with the user and not with the SSC. The S/W release should be accompanied by Makefiles or appropriate installation systems for selected systems.**

RESPONSE:

We will research any ITAR or Caltech legal restrictions that would impact the open release of our pipeline processing source code.   If we are allowed to release the source code, we are willing to do so. However, we are not convinced this is the right course to follow. We doubt that any caveats we express would stop users from expecting support from the SSC for source code we have provided. We believe it would be more useful to our users to put SSC resources into completing and updating the detailed pipeline description documents if the purpose is to provide observers with insights into how the pipeline algorithms work.   The SSC Oversight Committee agreed with this position.

- **SUP recommends initiation of a *web page,* maintained by SSC, to which community members can post their own developed software which they would like to make available to the Spitzer community. In analogy to the CXC, we recommend that the SSC provide a web-form to allow individuals to enter required information to potential users.**

RESPONSE:

We will contact Belinda Wilkes (SSC SUP member and head of Observer Support for CXC)

and ask her how they do this. If we do not uncover any unexpected problems and

if the level-of-effort to implement this is not large, we will adopt the recommendation

of the SUP.

- **Following the example of CXC, we also recommend establishing an e-mail or web-based *discussion group*, managed from the SSC, but which is completely self-supporting. This discussion group would engage members of the GO, Legacy and GTO communities to exchange information regarding instrument and software issues and new approaches to analyzing data.**

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and ask her how they do this. If we do not uncover any unexpected problems and

if the level-of-effort to implement this is not large, we will adopt the recommendation

of the SUP. In the meantime, the existing "technical interest groups" will be revitalized,

and we will look at broadening them since they could end up serving the same function.

● **Because a significant fraction of reduction and analysis software, both community-contributed and SSC-distributed (e.g. IRSFRINGE for IRS) requires use of IDL, we urge that the SSC examine mechanisms for supporting or subsidizing IDL licenses at sites where the cost of this package is substantial.**

RESPONSE:

All approved, US-based GO's will receive funding from the SSC.   Part of

the funding formula provides a base-level of funding to cover expenses that

are not directly a function of the amount or complexity of the data. This base

level is of order $10K, and this should easily support users who wish to purchase

an IDL license (which costs of order $1.5K).   The latest version of IDL (IDL 6.0)

provides the capability for developers to release applets or entire applications as

compiled code, with no licensing fee.   We will make use of this capability to allow

free distribution of SPICE.

- **One specific recommendation we can make at this time is to improve current documentation and tools for planning observations with IRS and to provide an "IRS Simulator" that would enable observers to simulate instrument performance for different classes of astronomical targets. This new tool should be developed in time to guide proposal preparation in Cycle 2.**

RESPONSE:

The specific impetus for this request was a lack of documentation to allow users to estimate IRS exposure times for cases with medium and high background. To address that specific concern, we will update the documentation to correct that oversight prior to the GO-2 call. We will also put development of an IRS simulator on our "to do" list, but it will be behind a few other tasks (such as implementation of the IRS Imaging AOT and IRS data analysis tools) which are higher priority and rely on the same people for implementation. In the short term, we hope that the availability of sample spectra in the Spitzer ApJSupp. issue will provide users with a good sense of what S/N can be expected for a variety of astrophysically interesting objects of specified flux.

- **The SSC home page be updated to give clear prominence to "SUP" so that users are aware that there is a panel charged with communicating their interests to the SSC. Contact information for the SUP and/or its members should be provided.**

RESPONSE:

We will do this.

Prior to the archive opening, we will modify the SSC homepage to include

prominent links to the SUP reports. A membership list will also be provided.

- **The SUP reviewed current policy regarding public dissemination of Spitzer results. We regard these policies to be appropriate to 'early days' and encourage close cooperation between members of the community having 'exciting new results', the SSC, and NASA. In the future, we hope that the current tight control on releases from Spitzer might be relaxed in service of allowing a bit more independence for Principal Investigators and their institutions in developing new releases.**

RESPONSE:

NASA has strict guidelines re: the content and release of Spitzer data in the time frame prior to the acceptance of peer-reviewed papers. We must follow those rules. Press releases announcing scientific results (with or without images) cannot be issued until papers have been accepted for publication. Other Images ("pretty pictures") can be released by the SSC, in concert with NASA. Weekly teleconferences between the SSC, JPL and NASA-HQ are held to plan upcoming releases.

The first Space Science Update featuring Spitzer science occurred on May 27.   With that milestone behind us, the SSC will work with scientists to release images/science news as rapidly as the community can provide it. Guideline for scientists with potentially newsworthy results are now posted on the SSC Web site ("Got News?"). NASA still retains the "right of first refusal", but the timescale to get this decision should only be a couple weeks on average.