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Re: Meeting #7 of the SOIFIA Science Users Group:

The SOFIA Science Users Group (SUG) met at Ames research Center during 15 April 2015. This meeting was supported by 8 of 10 committee members (Graf and Kaufman absent). The focus of this meeting is reflected by the agenda and presentations that are available on-line. Recommendations of the SUG resulting from discussion of these presentations with SOFIA staff follow (in no order):

Several US advisory committees currently support the SOFIA mission: SRB, SNOPAC, SSC, and SUG. The SUG and SSC are convened by USRA. The SNOPAC is said to be a HQ-convened committee; however, no charter for it is available. The SRB is apparently dormant with its most recent meeting having occurred during 2013. This committee structure is a concern to the SUG in the following two respects.

The SUG is under the impression that roughly 80% of the mission operating cost is incurred outside of the USRA contract. However, it is not clear that the SNOPAC is charted to review this aspect. The subject matter expertise of the SNOPAC members appears to be limited to science, leaving this committee ill equipped to advise on management effectiveness across program elements where the majority of operating cost is incurred.

R7.1 Given the overall programmatic complexity of the SOFIA program, the SUG strongly recommends that HQ put in place an active advisory structure that can provide independent input on the full scope of SOFIA cost elements and optimization of resources among them toward maximizing observatory science productivity.

The SUG, SNOPAC, and SSC committees encompass 21 members of which only 2 are women. The HQ SNOPAC committee includes no women. The SUG believes that USRA and the Science Mission Directorate Astronomy Division can do better in striving for diversity in its advisory committees for SOFIA. We feel that doing so is important to garnering the best advice and to inspiring growth of the airborne astronomy community.

R7.2 The SUG recommends that USRA and SMD make an effort to correct the lack of diversity that exists across the Project's advisory committees.

The SUG finds that the Science Mission Operations (SMO) team has made significant progress in the area of data analysis pipeline development toward delivering Level-3 data products to observers within their stated goal of 14-45 days. We strongly commend the SMO for this ongoing effort.

The SUG was asked to comment on a proposal to waive the FITS format requirement on data archived from the GREAT instrument in favor of retaining its native CLASS format. Although familiarity with CLASS is low within the US community, it is widely used by European programs. We feel that the staffing challenges currently faced by the data processing team, necessitate avoidance of the effort required to convert the CLASS data to FITS in a way that would be useful to archival researchers.

R7.3 The SUG recommends that CLASS format be permitted for Level 3 archived data products from the GREAT instrument and that compliance with the FITS format requirement remain applicable to higher-level data products.

Ground-segment software development and maintenance is critical to all aspects of SOFIA science productivity. In this light, the SUG is surprised that no full time staff support this office. Although the data processing team has made important gains over the near term, the SUG is skeptical that the current staffing plan for this office can meet Mission data processing requirements with resiliency going forward. In light of the part time staffing allocation to this mission critical activity and lack of an active independent advisory body that is charted and staffed to cover the full scope of operations cost elements and allocation among them, the SUG is concerned that allocation of resources may not be fully optimized to Mission science productivity. For example, the Project organization includes top-level offices that appear to be unnecessary (e.g., Observatory Systems Director office, Observatory Improvements office, Technology Demonstration office). During our next meeting, the SUG requests a presentation from NASA Project Scientist Marcum on the process by which project-wide resource allocations are optimized for SOFIA science productivity and the role of NASA (civil servant) project science staff in that process.

The SUG is concerned that little progress has been made on reducing the background emission that is hobbling the performance of the FLIGHTCAM instrument in the thermal portion of the near-infrared spectrum where FLITECAM/SOFIA has the greatest advantage over ground-based instruments. The SUG is under the impression that only a modest effort (~3 man weeks) is needed to complete electrical hook-up of the Nasmyth blower. We note that completing this work may be a path of least resistance for significantly improving FLIGHTCAM performance in this critical wavelength range, and one that would also provide collateral benefit to other instruments that are sensitive to emission from their Dewar pressure windows.

R7.4 The SUG recommends that the Project consider initiating action to enable the Nasmyth blower in the near term.

The SUG commends the water vapor monitor team for making great progress with this critical instrument.

The SUG strongly supports the Project's plan to make two instruments available on the next southern hemisphere deployment. However, the SUG notes that scientists who wish to use SOFIA on the southern sky will only submit proposals to do so if they believe that the instrument of interest will be available. As we have mentioned in prior reports, brief access to southern sky targets can be enabled by flight programs that require only brief stays at southern airfields for fueling and crew rest without necessity for an extensive "fly-away kit" of supplies or a large compliment of ground support personnel. SOFIA's capability to utilize commercial aviation airfields is a key aspect of its enhanced airmobile capability over that of the KAO, which has not yet been planned or utilized.

R7.5 The SUG recommends that the Project follow a "put the mission science first" approach and let proposal pressure, rather than shipping logistics, determine the instrument complement that is made available on deployment, as well as the deployment venue. We recommend that the Project develop utilization plans for a small set of southern airfields to enable a set of cost effective options for supporting a range of southern sky observing projects toward a goal of enabling southern sky proposals to utilize any facility instrument on every proposal call.

The SUG strongly commends the project for beginning work on proposal development for the senior review. We are impressed that clear roles and responsibilities among the proposal team and a milestone schedule have been developed. A number of open questions were presented to the SUG by Pam Marcum. The SUG will discuss them via telecon.

In our prior (October 2014) report, the SUG recommended increasing the Director's Discretionary time by approximately a factor of two. We believe that giving the SMO Director ability to implement robust non-proprietary science investigations that best utilize SOFIA unique capability is an excellent way to enhance SOFIA science productivity in the near term. We recommend that: [a] these projects be fleshed-out using small teams of

external young (post-doc/assistant professor) subject matter experts who are selected by an ad-hoc USRA process, and [b] these small teams should be encouraged to go on the resulting flights in order to understand the observing environment and to monitor the quality of the resulting archive data relative to the science goals. This approach can lead to excellent science that is highly cited and that can inspire a high quality set of young investigators to join the airborne astronomy community over the long term.

R7.6 The SUG recommends increasing the Director's Discretionary time allocation by approximately a factor of two, beginning on Cycle 4, to enable non-proprietary science projects.

The SUG notes that the science productivity and broader impact of the GO program is severely compromised by the difficulty in supporting graduate students and post-docs at the current funding level of $3K/hr. We note that the work required by GO teams to convert SOFIA Level 3 data products into published journal articles is generally the same as that for the orbital program. However, the direct science support that is provided by SOFIA to fund this GO team labor is significantly below that of the orbital program -- limiting the science productivity of these teams and community ability to effectively use SOFIA.

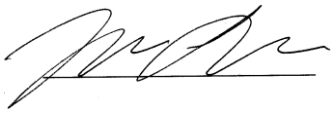
R7.7 The SUG strongly recommends that direct science support funding for GO team labor be increased. We suggest that orbital program visitor facilities that require similar analysis tasks (e.g., HST, Spitzer) be used as benchmarks in formulating this funding level.

The SUG advocates a phased approach to the planned NRA solicitation for new science instruments. The SUG notes that SOFIA must oversee instrument development projects on a monthly basis with a team that includes expertise in areas of small project management, SOFIA systems engineering, optical, electrical, detector, other engineering disciplines, and science operations. Roles and responsibilities between NASA and USRA for this aspect are not made clear in the top-level project organization.

R7.8 The SUG recommends that single point accountability for oversight of science instrument development projects and a plan for staffing this aspect be fully fleshed-out prior to beginning these new projects.

We thank the Project for clear concise presentations and appreciate the effort that went into producing them.

Sincerely,



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