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Re: Meeting #7 of the [SOFIA Science Users Group](#):

The SOFIA Science Users Group (SUG) met at Ames Research Center during 18 November 2015. This meeting was supported by 10 of 11 committee members (Graf 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):

The SUG thanks Lee Armus for his service to SOFIA as a SUG committee member for the past 4 years. We welcome new committee members Kate Su and Jean Chiar.

We congratulate the Project on realizing, to date, 90% of its 70 planned Cycle 3 flights, and a successful multi-instrument deployment to New Zealand.

We are impressed by the science highlights from the EXES, FORCAST, and upGREAT instruments in terms of their potential science impact and the extent to which they exploit unique capabilities of SOFIA. We were particularly impressed by the survey speed of upGREAT relative to Herschel. We suggest that this important capability of upGREAT be described in professional outreach messages and presentations.

We congratulate the Project on a successful observation of the Pluto occultation. We suggest that the Project be proactive in determining if SOFIA can support the New Horizons encounter with KBO: 2014 MU69 with respect to infrared characterization of the KBO.

The SUG is unclear on exactly what transpired during the exoplanet time that was awarded during cycle 3, and is concerned that no time was awarded to this topic during cycle 4. One expects that atmospheric scintillation noise would be reduced at SOFIA altitude, and the SOFIA instruments should not have inherent noise properties that are significantly different from their ground-based analogues. SOFIA's ability to support this rapidly growing field may be important to SOFIA's future and the development of future SOFIA instrumentation.

R8.1 We recommend that a synopsis of the cycle 3 exoplanet results be presented at the next SUG meeting with emphasis on aspects that limited the success of the cycle 3 attempt and what technical options exist to mitigate them.

We are impressed by the highlighted projects that have been selected for cycle 4. We fully support the introduction of non-proprietary "impact programs" on this cycle and the continuation of this project category in the cycle 5 solicitation.

We thank the Project for responding to our prior concern (R7.7) about the amount of direct science support that is provided to users in view of postdoc and graduate student labor costs. We recommend that the new support level of \$10K/hr appear prominently in messages to the professional community ahead of the Cycle 5 call.

The SUG commends the Project for setting clear science productivity goals for prioritization of observatory improvements and overall conduct of the program. However, we are concerned that two of the stated goals are problematic. First, setting a factor of 5 goal on oversubscription of the GI proposal calls is, perhaps, a good goal for measuring the effectiveness of the Project's professional outreach effort. However, rejected proposals do not contribute to the scientific impact of SOFIA. We believe that assessment of SOFIA's scientific impact must focus on what happens to research hours that are awarded.

We feel that the observatory's productivity goal of 1 paper per 10 research flight hours should be measured only in a cumulative fashion. The HST consistently finds that a 2 year delay between data acquisition and publication has been typical over the life of the HST. We are encouraged that this measure of productivity is beginning to show growth in proportion to cumulative research hours. However, we note that a significant increase in this growth function is needed to meet the Program's productivity goal during the first 5 years of full operations.

We commend the Project on its use of Director's Discretionary (DD) time to date and specifically its use for the Horse Head Nebula demonstration project which we feel is well chosen in terms of illustrating potential impact of upGREAT. However, we are concerned about the absence of a science team and the Project's stated goal of producing a paper without scientific interpretation. SUG is concerned that, although the data from this program is non-proprietary, there are no clear plans for scientific interpretation apart from faith in NASA's archival research program. Excerpting from our prior report:

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.

We feel that having specific science teams associated with these non-proprietary projects is critical to their success in achieving near-term scientific impact. Absent this organization, these data may sit in the archive for a very long time before they are, if ever, effectively utilized.

R8.2 The SUG recommends that DD "demonstration projects" have ad hoc community science teams associated with their planning and execution to enable initial scientific impact without dependence on Archival Research Program funding.

The SUG strongly commends the Project's effort to enable southern sky access to FORCAST, FIFI-LS, and upGREAT during cycle 4, consistent with proposal pressure, by expanding its multi-instrument capability on southern deployments from 2 to 3.

The SUG commends the project on its continuing effort to deliver level 3 data products to the archive within 15 days of acquisition, and on specific improvements that have been made to the pipelines. However, our prior concern about full time staffing in data reduction and analysis software development remains high. Pipelines have yet to be developed for the water vapor monitor, HAWC+, and FIFI-LS. It does not appear to us that the SMO is staffed for long term success in an area that is critical for achieving science productivity. Several SUG members find that the archive software itself remains difficult to use.

R8.3 The SUG recommends that the Project invest significantly in staffing for pipeline and archive development such that much less reliance is placed on multi-tasking of individuals across multiple instruments and activities.

We are delighted by the successful commissioning of the FIFI-LS and EXES instruments and we look forward to their cycle 4 productivity.

We thank the Project for investigating the anomalous background emission seen in the FLITECAM instrument with the root cause determined as stray light from the #1 engine plume. We look forward to seeing the mitigation plan. We note that since the SOFIA instrumentation operates on the Rayleigh-Jeans side of this emission, other instruments may be effected to some degree. We recommend analysis to determine the degree to which FORCAST might be affected by this background, and that operational constraints be considered for the affected instruments until this stray light path can be mitigated.

We appreciate the Project's continuing effort on characterizing data from the water vapor monitor (WVM). SUG fully supports the plans presented for the verification of the WVM results against science instruments, for the timely availability of these results to science instruments that need them, for making the conversion algorithms accessible to the instrument teams that might need them, and for improving the onboard software so that it delivers meaningful results during flight.

The SUG was asked to comment on the need for a fully reflective tertiary mirror. We feel that the risk associated with routinely changing this mirror overrides the anticipated performance gain.

We note that SOFIA's social media presence has generally improved over the past year in terms of meaningful content (science in particular). Social media is a primary professional outreach tool that in some instances can be more effective than the SMO web site. However, we notice that the stated roles and responsibilities among the ARC and AFRC are unclear as concerns social media.

The SUG was asked to comment on the USRA website for SOFIA. We find that the portion of the website that is intended for researchers is fully adequate to support proposal preparation. However, the home page is wanting for basic maintenance. For example, the "SOFIA team" and "mission schedule" links have no content. The "contact us" link refers to the bad team link. The "science behind SOFIA" page design contains only very top level information with no linkage to what SOFIA is doing and has done scientifically. The home page has no link for the media. There is no webmaster indicated for this site. We note that having a webmaster that is single point accountable for it provides a good way to ensure that its design and content are proactively maintained.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Matt Greenhouse', written over a horizontal line.

Matt Greenhouse
Chair: SOFIA Science Users Group