

2020 June 26

To: Dr. Margaret Meixner, Director SOFIA Science Mission Operations

Re: SOFIA Science Users Group (SUG) Meeting# 16 – Report

The SOFIA Science Users Group (SUG) held its 16th meeting virtually (via RingCentral™) on Wednesday 17 June 2020. The primary discussion topics between SUG members and the SOFIA Science Mission Operations (SMO), led by Drs. Margaret Meixner, SMO Director and James Jackson, Associate Director for Research, SOFIA Science Center, are captured in the meeting Agenda. Expanded details and charts presented at the SUG meeting are available at:

<https://www.sofia.usra.edu/science/sofia-overview/advisory-groups/sofia-users-group-sug>

The SUG appreciates the SMO efforts to make charts-decks available to the SUG well in advance of the meeting date.

One new member, Dr. Zoe Landman, has rotated on to the SUG.

The conversation between the SUG and the SMO occurred during a period that flight operations and on-site, day-to-day activities of the SMO have been impacted by the COVID19 pandemic shutdown (Stage 4) of NASA research facilities. No SOFIA flight manifests over the last 3 months were completed, nor is it likely for the foreseeable future that any campaigns shall commence. Hence the promise of the selected Cycle 8 science will not be fully realized.

However, 2020 marks the 10th anniversary of science activities with SOFIA. The SUG applauds efforts by all those individuals involved with the Project in passing this milestone of achievement.

Below are highlights and recommendations based on the SMO staff presentations and conversations, which were consensus items derived from the SUG's impressions (not necessarily in rank order, but thematically grouped). We have itemized each highlight for clarity and to enable specific reference to recommendations and actions in future discussions.

[SUG16-1] RESPONSE TO SUG15 REPORT

The SUG appreciated the SMO's point-by-point response to issues raised in the SUG 15 letter report of 2019 November 19 and was encouraged by the SMO actions and implementation initiatives.

[SUG16 – 2] LEADERSHIP:

The SUG is pleased that a new SMO Director search was completed expeditiously. The SUG is delighted that Dr. Margaret Meixner has assumed the leadership role as SMO Director. The SUG was encouraged by the overarching vision outlined by the Director to specifically focus SMO efforts to singularly improve the science productivity of SOFIA. Clearly the intent is to move the culture from operations to one where the SMO works collaboratively with the broad science community to create a success-driven posture.

The SUG encourages the Director to continue to explore and implement actions that center on community building relationships, especially those with other NASA missions and appropriate ground-based observatories that have capabilities (e.g., beam sizes, mapping efficiencies) that complement SOFIA instruments and legacy science programs.

[SUG16 – 3] PROJECT PERFORMANCE METRICS:

The SUG endorses the proposed core quantitative performance metrics (h-index, citation count, publication rates) identified by the SMO in response to recommendations within the FMR and SOMER reviews. Specifically, the SUG concurs that two goals are reasonable measures of Project productivity: (1) 80% cycle completion rate for Priority 1 selected programs, and (2) a publication rate of 75 publications per annum.

The SUG requests that the science impact of SOFIA be carefully tracked, collecting outcomes assessment data using standard metric criteria employed within the fields of astrophysics, planetary sciences, theory, and instrumentation. The SUG requests that these production measures be reported to the SUG on a regular basis.

The SUG recommends that the SMO use new tools available through the NASA Astrophysics Data System (ADS) repository to examine the “click-through and read” statistics associated with SOFIA related publication as a secondary gauge of impact.

[SUG 16– 4] FORCAST:

The SUG reiterates the importance of FORCAST as an important strategic instrument in the SOFIA portfolio. This instrument provides the only means to conduct science that cannot be duplicated in any NASA missions or ground-based facilities. The potential decommissioning or withdrawal of this instrument must carefully be considered by the SMO, in consultation with various user communities in advance.

[SUG16 – 4] GREAT:

The SUG encourages the SMO to work collaboratively with the GREAT team to understand whether additional flights within the Cycle 9 period can be supported to backfill lost Cycle 8 Priority 1 science.

The SUG requests the SMO develop and provide a prospectus for the long-term, future use and support of this instrument on SOFIA.

[SUG16 – 5] FUTURE SOFIA INSTRUMENTATION:

HIRMES instrument development has been terminated by NASA, an outcome consistent with many of the prior serious concerns raised by the SUG regarding the trajectory of this effort. Cancellation leaves a gap in the ability for SOFIA to roll on new instruments and capabilities. The SUG notes that NASA has charged the SMO to quickly develop a new instrumentation roadmap. The SUG requests the SMO provide the “white-paper” resulting from discussions in the 2020 June 22-24 workshop (science cases) entitled, “Building the SOFIA 2020-2025 Instrument Roadmap,” and the second 2020 July instrument workshop (the follow on discussing concepts and feasibilities) prior to the next SUG meeting for consideration.

The SUG advises the SMO that initial “quick-hitters” that involve upgrades to current operating SOFIA instrumentation that are minimally invasive, with short implementation and/or instrument downtime and test schedules of low-risk have high merit. Likely, such upgrades could have a significant impact on science return and enhance operational efficiency.

The SUG recommends that the SMO should consider including a stated preference regarding a new instrument’s capabilities in the Call for Proposals if warranted by the community feedback while still permitting proposals for any suitable instrument.

The SUG advises the SMO to carefully review lessons learned from past instrument development activities, including HIRMES, to identify means to minimize program management burdens and develop a model for successful delivery schedules that are prudent and realistic. The SUG identified thematic instrument proposal calls as one means to develop instruments that meet the needs of the scientific community and will produce high-impact results. The SUG hopes that the formal NASA Call for Proposals will reflect the sentiments of the SMO instrument scientists in regard to delivery schedules.

The SUG is seriously concerned with the perceived instability of the SOFIA Project wrought by the frequent cadence of NASA reviews and the vacillation on long-term commitments. This environment impacts both US and German instrument teams contemplating participation in major new SOFIA instrument builds. The SUG recommends the SMO work with NASA and other stakeholders to project confidence into the SOFIA instrument roadmap.

[SUG16 – 6] INSTRUMENT FLIGHT READINESS:

The SUG requests the SMO expend the necessary time and effort to insure full and immediate inflight science operability of all instruments that have had maintenance interventions. The SUG notes that sufficiently dedicated engineering legs may be required to properly calibrate (e.g., wavelength, responsivity, alignment) and verify instrument performance. Revised instrument performance data should be immediately folded into the proper data pipeline modules to ensure timely delivery of Level 3 data products to investigators. Updates and other changes should be documented and how they impact observations be communicated to investigators in a timely

manner. Issues that impact specific flights and flight series that delay data delivery and affect data quality and reliability should also be communicated to investigators promptly.

[SUG16 – 7] JOINT PROPOSAL INITIATIVES:

The SUG encourages the SMO to pursue additional joint proposal opportunities (beyond the current NRAO Greenbank agreement) between SOFIA and other NASA missions (such as HST and JWST) and observatory facilities to enhance science return and productivity impact. The NASA IRTF was identified as one high-merit ground-based facility for such joint opportunities. Other representative facilities to explore collaborations could include mm/sub-mm observatories such as APEX, the ARO Kitt Peak 12-m and the SMA Mt. Graham 10-m single dish facilities and the SMA interferometer. Joint opportunities should be widely publicized to the broader astronomical community through newsletters and press releases from both/all partners, for example, in addition to the SOFIA Calls for Proposals.

The SUG requests updates on new partnerships, the proposal success statistics, and scientific impact and return of these initiatives.

[SUG16 – 8] TARGET OF OPPORTUNITY SCIENCE IN THE TIME DOMAIN:

The SUG discussed several high impact target of opportunity (TOOs) and other time domain science cases that require multiple visits to a target that may span several months or years, involve various instruments, and potentially observatory cycles. Clarity was not evident in SMO policies and procedures to effectively execute these science programs, especially if these are Priority 1 allocations that can be carried over. The SUG requests the SMO to identify and establish processes to facilitate such science.

The SUG recommends the SMO identify an advocate within the science staff to lead and coordinate SOFIA response to this new science frontier.

[SUG16 – 9] PROPOSAL PLANNING TOOLS:

The SUG recommends the SMO to continue enhancement of proposal planning tools to reflect conditions that actually are encountered during typical flight profiles. As technical reviews of proposals are carrying greater weight, it is incumbent on the SMO to provide the best tools to investigators for accurate signal-to-noise estimates under a variety of conditions, enabling optimization of science hour requests and maximization of program feasibility.

The SUG requests additional information regarding how the new forward modelling of flight conditions (NASA GEOS based) compares to models using total water column.

[SUG16– 10] PYTHON CODE TRANSITION:

The SUG advises that the SMO review whether release of Python reduction pipelines and techniques used therein are ITAR compliant.

The SUG requests that the SMO review and enhance Python Jupyter notebooks and other cookbooks documentation (found off the <http://www.sofia.usra.edu> Documentation for Data Products landing page). These Python routines should be Python3 compliant using Astropy 4.0 release packages and should be regularly reviewed and refreshed to keep them current.

[SUG16– 11] ALTERNATIVE SOUTHERN HEMISPHERE OPS BASES:

SOFIA flights from New Zealand (several week duty-station out of NSF facilities in Christchurch) are scientifically highly advantageous due to the enhanced number of flight hours above the troposphere and the rich target environment at southern declinations. The SUG encourages the SMO to continue work to identify alternative sites for short duration “hot-shot” or brief “suit-case” deploys and assess the logistical feasibility through a pilot exercise during Cycle 9.

[SUG16– 12] HOUSEKEEPING:

The SUG requests the SMO update the SUG membership list to reflect the current composition of the committee (<https://www.sofia.usra.edu/science/sofia-overview/advisory-groups/sofia-users-group-sug>).

Respectfully,



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