

# **REPORT OF THE APRIL 28, 2014 SOFIA USERS GROUP (SUG)**

## **1.0 INTRODUCTION**

The fifth meeting of the SOFIA Users Group (SUG) took place on April 28, 2014 at the SOFIA Science Center, Building N232, Conference Room 103, NASA Ames Research Center, Moffett Field, CA. The SUG is charged with providing input to the SOFIA Project by a representative sample of the scientific community of users and potential users. The SOFIA Users Group Charter and the agenda for the April 28, 2014 meeting and the SUG membership may be viewed and downloaded on the internet at:

[http://www.sofia.usra.edu/Science/advisorygroups/sug/SUG\\_005/index.html](http://www.sofia.usra.edu/Science/advisorygroups/sug/SUG_005/index.html)

Members attending the April 28, 2014 meeting were Lee Armus, John Bally, Imke de Pater, Jochen Eislöffel (by speaker phone), Bob Gehrz, (Chair), , Matt Greenhouse, Al Harper, Michael Kaufman (by speaker phone), and Luke Keller.

The SUG thanks the SOFIA Project personnel involved in supporting the meeting and preparing the informative presentations.

## **2.0 OVERVIEW OF THE STATUS OF THE SOFIA PROJECT**

The SUG found that commendable progress has been made on many fronts since the November 19, 2013 SUG 4 Meeting. In particular, the capability for tracking non-sidereal objects has been successfully implemented and demonstrated in flight. The commissioning of three new science instruments (FLITECAM in FLIPPO mode, EXES, and FIFI-LS in three months was a major accomplishment of which the Project can be proud. Observation scripting has been improved and problems with the MCCS seem to be diminishing in frequency. The Director's Discretionary Time process was successfully tested by proposers wishing to observe Supernova 2014J in M82, the brightest type Ia supernova to explode in more than 20 years. Four proposals were ingested and all were awarded time on a collaborative basis and under the condition that the level three data products would be released immediately to the astronomical community. Finally, we are happy to hear that the process for General Investigator (GI) access to the Armstrong flight research center has been streamlined.

## **3.0 ISSUES ARISING DURING THE SUG5 DISCUSSIONS**

We review here issues identified during SUG 5 discussions that we would like the SOFIA Project to consider for action. The language in several of the sections below reflects issues left over from SUG 4 that have not yet been fully addressed.

### ***3.1 Schedule for Releasing Data into the Public Archive***

The SUG believes that general investigators (GIs) should have a full 12 months of proprietary time starting from the date that level three data for their programs are ingested into the archive. No data, regardless of processing level, should be released to the public during the proprietary time for GI programs. This policy would ensure that GIs have ample time to analyze and publish

their data before the results can be mined by others and it will also ensure that bad science is not done with level one and level two data that have not been fully vetted and calibrated.

### ***3.2 Metrics for Success***

We were pleased to learn that the Project is developing a set of metrics to measure scientific success and improve the performance of the observatory. We wish to see ongoing reports on the analysis of these metrics as part of the general overview at future SUG meetings. As a start, we ask that at the next SUG meeting (SUG 6) the science center present numerical values for these metrics. In addition to the metrics that assess operations, we would like to see metrics that evaluate scientific productivity. These should include the amount of level three data that has been delivered to the archives, the number of journal papers separated into those published by general investigators and those published up by science instrument teams, metrics for the science impact of these papers (such as citations). We recommend that non-refereed publications such as PhD theses and conference proceedings also be tracked and compiled. We recommend that the SSC calculate and maintain an H index for SOFIA that integrates over all publications (both refereed and non-refereed).

We would like to hear how the metrics are being used to improve the performance of the Observatory. We would like to hear how the data reduction pipelines are improving the quality of the delivered data, and suggest that a regular feature of the SUG meetings be a discussion of the most important (“top 5”) data quality, or data reduction issues. This will become more important as the number and complexity of the available modes/instruments increases in future cycles. Maximizing observing time is of the essence, and we would like to see a “lego” chart schedule at future SUG meetings to help us understand whether engineering flights are being utilized to do science when possible.

### ***3.3 The Water Vapor Monitor and Calibration Issues***

The SUG 4 report had requested that the SUG receive a report on the status of the water vapor monitor (WVM). This item has been postponed until the SUG 6 meeting due to the absence of critical personnel. A major calibration effort is required to understand how to deal with the water vapor monitor (WVM) data and to compare it with water vapor measures obtained with GREAT, FORCAST GRISMs, and ground-based observatories. First, the monitor needs to be repaired so reliable data can be extracted. Simon Radford at Caltech should be consulted regarding water vapor measurements extracted from ALMA. A report on the long-term calibration plan should be presented at the next SUG meeting. If uncertainties in the atmospheric modeling prevent the release of accurately calibrated water vapor data, the WVM should at least provide a reliable stream of brightness temperatures and line shapes of the observed water line.

### ***3.4 Deployments to the Southern Hemisphere***

We continue to encourage the Project to investigate the possibility of deploying multiple SIs on a given southern hemisphere visit and conducting scientific observations on the deployment legs. Flights to major airfields in Central and South America should continue to be investigated as options that might minimize ferry time for observations of southern targets of opportunity. These might enable the observation of southern objects of opportunity that could be reached

from Palmdale with a single intermediate stop for refueling. We recommend that, as a matter of policy, science be done on ferry flights whenever possible - particularly on flights from Palmdale to Hawaii.

### ***3.5 Information about Visits to NASA Building 703 at AFRC***

The project has prepared an improved set of documents giving visitors to Building 703 at the Armstrong Flight Research Center (AFRC) and GIs flying on SOFIA during the execution of their science programs quite complete information about the requirements that must be met. It was noted that lists of motels and sources of night lunch need to be added. The process for gaining access to Building 703 is now much easier to navigate and it is clear which personnel to contact for assistance.

### ***3.6 FLITECAM Sensitivity***

It was noted that FLITECAM sensitivity beyond 3 microns is currently being limited by excessively high background radiation in the current FLIPO configuration, possibly due to the presence of the warm beam splitter that feeds HIPO. We suggest that FLITECAM be tested in a clean configuration either on the ground or in flight to assess the problem. Analysis should be conducted to determine how the background can be mitigated in the FLIPO mode. The 3 - 5 micron range is astrophysically important and a possible niche for SOFIA. We ask that a status update on the root-cause analysis and mitigation plans be presented at SUG-6.

### ***3.8 Ability of the GIs to Change Observations in Flight***

In order to maintain the versatility and flexibility of SOFIA observations, one of the defining advantages of the airborne platform, the SUG 4 recommended that the director of science operations draft guidelines for enabling "on the fly" changes in observing plans based on unforeseen changes in observation parameters. This has largely been done. We believe that an explicit statement should be added for time-variable objects and transient events of opportunity that appropriate changes to the observing program suggested by a GI in flight should be acted upon when possible even if there is a conflict that may result in the data being assigned to another GI team post-flight. The conflict can be resolved post-flight.

### ***3.8 Development of New Science Instruments***

The Project needs to begin planning now for the next generations of Science Instruments (SIs). The results of the first call for SIs showed that the current technical specifications have driven costs for new SIs far above acceptable limits. We strongly recommend a review of policies for SOFIA instrument development, with the goals of 1) reducing development time and cost, 2) facilitating deployment of new technologies, and 3) encouraging the career development of young experimentalists. These have been hallmarks of the airborne astronomy program since its

inception. Funding must be sufficient to design and build multiple new instruments. This can be facilitated by reviewing policies and procedures currently in place that are intended for space flight and experimental aircraft development, but are exceedingly time-consuming and restrictive for development of astronomical instrumentation. This can be done while continuing to insure safety on SOFIA. We specifically recommend that the AO TIMCO review procedure be optimized for SOFIA toward the goal of reducing proposal complexity, implementation cost, and to hold focus on the sub-orbital program context of enabling proposals offered by small university teams working without the involvement of an aerospace contractor. We feel that failure to make a course correction that will enable prompt planning for the next generation of SIs would be an existential threat to the SOFIA program.

### *3.8 Outreach to the Science Community*

The continual threat of cancellation and the relatively slow rate at which SOFIA publications are appearing in the scientific journals threaten to create apathy among the potential user community. The project should keep community interest high by:

- Revitalizing the SOFIA Speakers Bureau
- Publicizing the Wednesday Community Teletalks much more widely (e.g., on social media sites such as the Astronomers FaceBook page) and supporting the organizers of this series such that it can function as a primary professional outreach activity.
- Holding workshops and summer schools on SOFIA science
- Including language in future calls for observing proposals that specifically directs the proposers attention to the rapidly increasing body of scientific results from SOFIA (e.g. providing URLs to the teletalks, Speakers Bureau talks, and scientific publications)

Respectfully submitted on behalf of the SOFIA Users Group,

A handwritten signature in black ink, appearing to read 'R. Gehrz', with a long, sweeping underline that extends to the right.

Robert D. Gehrz, Chair

May 20, 2014