

November 26, 2019

Dr. Paul Hertz
Astrophysics Director
Science Mission Directorate
National Aeronautics and Space Administration (NASA)

Dear Paul,

The NASA Astrophysics Advisory Committee (APAC) had its Fall meeting via telecom/webex on October 28-29, 2019. The following members of the APAC attended the meeting: Laura Brenneman, John Conklin, Massimiliano Galeazzi, Jessica Gaskin, Hashima Hasan (APAC Executive Secretary), Kelly Holley-Bockelman, William Jones, Margaret Meixner, Michael Meyer, Leonidas Moustakas, Feryal Özel (Chair), Lucianne Walkowicz, and Charles (Chick) Woodward (Vice Chair). Suvrath Mahadevan was present for part of the meeting and Kerri Cahoy and Asantha Cooray were unable to attend.

Dr. Hasan opened the meeting by extending a welcome to our new member Michael Meyer, welcoming all the APAC members, and noting the APAC members who had conflicts of interest with specific topics on the agenda. The conflicted members were allowed to listen to the presentation as members of the public, but they could not participate in the discussion. Dr. Hasan then reviewed the Federal Advisory Committee Act (FACA) rules. Dr. Ozel then welcomed the members to the meeting and reiterated some of the FACA and conflict of interest rules.

The agenda consisted of the following presentations:

- Astrophysics Division Update – Eric Smith and Paul Hertz
- PhysPAG, COPAG, and ExoPAG updates – John Conklin, Margaret Meixner, and Michael Meyer
- SOFIA independent reviews and the project response – Kartik Sheth, Naseem Rangwala, and Harold Yorke
- Balloon Program Update – Debora Fairbrother
- Astro 2020 Update – Fiona Harrison and Rob Kennicutt
- James Webb Space Telescope Update – Eric Smith/Greg Robinson
- Dual Anonymous Review – Neill Reid/Dan Evans
- R&A Update – Eric Smith
- IXPE Update -- Martin Weisskopf
- WFIRST Update – Jeff Kruk

The APAC sincerely thanks all of the presenters for their time and their informative presentations.

As a result of the presentations and discussions during the meeting, APAC (“the committee”) has the following findings and recommendations.



APD Report by Dr. Eric Smith and Dr. Hertz

On behalf of the Astrophysics Division, Dr. Eric Smith presented science highlights, status updates from NASA astrophysics missions from the recent months, and the preliminary FY20 budget numbers, which are still under discussion.

Dr. Smith listed the following highlights on current missions and programs: The Balloon Program has recovered from its recent string of launch problems and had a very successful season; the R&A funding has continued its steady increase; JWST work is proceeding according to the replan; WFIRST is undergoing Preliminary Design Review; the balloon mission of opportunity GUSTO has passed its Critical Design Review; NASA's contribution to the JAXA mission XRISM has successfully completed its pre-ship review; and NASA's hardware contribution to the ESA mission Euclid has been delivered.

Finding

The APAC found these developments to be overwhelmingly positive and commends everyone involved in these developments for their hard work and contributions.

Dr. Smith also presented the ongoing discussions for the FY20 NASA Astrophysics budget. While there are no actionable items while the process unfolds, the committee noted with extreme concern the 29% or \$133.9M cut to the "rest of astrophysics" programs currently present in the Senate budget and the detrimental impact this would have to many programs in the division.

Dr. Smith then discussed the continuing PI Launchpad effort within the SMD and the PI resources website that is now operating and is designed to attract new talent and investigators, especially those early- and mid-career individuals. Efforts to enhance teaming enterprises between HBCUs, Tribal Colleges, and other under-served communities with NASA Centers and Universities and their affiliated research institutions that historically have had long-standing NASA SMD related relationships also was discussed.

Recommendation

APAC would like to see a plan from Dr. Hertz for publicizing PI Launchpad and other efforts to increase diversity within NASA Astrophysics and to increase engagement from the broader community. APAC also requests a report on the success metrics, quantified to track outcomes resulting in the division-wide efforts to lower participation barriers for early- and mid-career investigators across a span of institutions and NASA Centers. APAC requests that APD track the impact of these programs on the diversity of Astrophysics missions, programs, and proposals submitted to the APD.

PhysPAG, COPAG, and ExoPAG Reports

Dr. Conklin reviewed recent PhysPAG activities. He informed the committee that he was finishing his term as chair. He updated the committee on the Multi-messenger Astrophysics SAG and reported that 10 white papers to the decadal committee were organized by this SAG. The final report will be completed by the end of 2019. He also explained that the PhysPAG executive committee was asked to review the "technology gaps" process and that they found it to be effective. There were no actions or recommendations resulting from this presentation.

Dr. Meixner reported on the membership and the recent activities of COPAG. She explained that there was a call for new members on the PAG and that the PAG had just wrapped up its involvement in the Large Mission Concept studies. Dr. Meixner then presented the draft charter for a new SAG on Cosmic



Dawn that the COPAG will be requesting soon and asked for comments from the APAC members in the few weeks following this APAC meeting.

The committee asked Dr. Meixner to bring the request for the SAG to the next APAC meeting in the spring for a formal recommendation to the Division Director.

Dr. Meyer reviewed the plethora of recent ExoPAG activities, including the ExoPAG 20 meeting, numerous decadal white papers the PAG helped organize, and the close-out of SIG19. There were no actions requested from ExoPAG.

SOFIA SOMER and FMR Reviews and the Project Response

Dr. Kartik Sheth provided an update on the technical and science review of the SOFIA mission and summarized the detailed findings and recommendations from the SOMER and FMR reports.

Dr. Naseem Rangwala presented the project scientist response, while Dr. Harold Yorke presented SOFIA science center leadership's preliminary response. The described changes included a new project manager, increased frequency of leadership meetings, experimenting with 8/10-hour flights, and steps to cultivate a "science-driven culture".

The APAC commends the effort of review teams resulting in the SOMER and FMR recommendations. APAC did not have access to the full reports; however, the quality and the specificity of the summaries of the reports represent exactly the kind of objective perspective that is necessary for affecting meaningful change in the status quo of the SOFIA project. The recommendations were clear and were included in the presentation material (Sheth, SOMER pages : 11-13, FMR pages : 16-21).

The key findings state that "Bold vision and transformative change are needed..." and "The mission would benefit greatly from a paradigm shift in aircraft operations, a substantial increase in flight hours at stratospheric altitudes...". Specifically, a key recommendation is to "Transition SOFIA aircraft operations away from an integrated astrophysics program into an existing independent aircraft management model - such as SMD's Airborne Science Program (ASP) - in order to leverage aircraft operations expertise."

Findings

APAC finds that the SOMER and FMR reports are extremely timely and are essential to change the course of the SOFIA mission from its current state toward success. It concurs with the findings and recommendations in both reports.

The recommendations and the executive summary as provided are too sparse to understand the full context behind the recommendations and to assess if particular responses by the SOFIA team will sufficiently address these recommendations. It is highly beneficial for the community to see the full reports.

The committee established that the scientific output would benefit "by focusing efforts on extracting the latent science potential of existing instruments and developing data archive tools than from development of new instruments beyond those already underway." Finally, "A stronger sense of urgency within SOFIA leadership is essential to set the course for the future."

APAC finds that the current responses by the SOFIA team to date, as presented in the October meeting, to be superficial and not yet addressing the most important recommendations that are crucial for scientific success.



Recommendations

APAC requests the full SOMER and FMR reports prior to its next meeting. Any information that cannot be made public can be redacted.

APAC requests immediate action on the most urgent recommendations: separating the flight and science operations and increasing the flight hours at stratospheric altitudes.

APAC requests a written response from the SOFIA team, prior to the next meeting, on (i) the change in the flight operations that were implemented and whether they follow exactly the SOMER and FMR recommendations and (ii) the metrics of success the team will be judged by and how these compare quantitatively to the SOMER and FMR recommendations.

APAC requests at its next meeting a presentation of a progress-status update for implementing the specific recommendations outlined in the SOMER and FMR reports. APAC also requests that the chairs of the SOMER and FMR reviews be present for that status report.

In the event that SOFIA leadership declines to implement or substantially modifies a recommended action, or where progress has not been made, the APAC requests a report justifying those variances. The APAC further finds that the implementation of the SOMER and FMR recommendations, coupled with the metrics of the scientific output of the program after their implementation, should be presented in the context of the first SOFIA Senior Review. The continuation of the mission should be contingent upon meeting those metrics.

Balloon Program Update

Debora Fairbrother updated the APAC on the recent progress in the balloon program. In an earlier meeting, the APAC had been briefed about the recent launch failures and the plans to test the release mechanism that was thought to cause these failures.

Finding

The committee was delighted with the striking progress in the balloon program. The changes implemented in the release mechanism enabled a large number of consecutive successful launches from Ft. Sumner. The committee also viewed positively the addition of a third launch crew implemented to reduce stress on the available launch crews.

Recommendation

APAC recommends that the balloon program start evaluating alternate sites to Palestine, in light of the increasing restrictions due to population growth in the area, and limited ability to alter the risk posture. Specifically, the new site(s) should be evaluated on the feasibility of evening launches, which is required by some science cases, and is a capability uniquely offered in Palestine at this time. APAC also requests an update on the Wanaka site in the near future.

Astro 2020 Update

Dr. Fiona Harrison and Dr. Rob Kennicutt updated the APAC on the recent developments in the Astro 2020 decadal survey, including the statistics on white papers submitted by the community, the structure and the early meetings of the science and program panels, the differences with the earlier decadal survey such as the “state of the profession” panel, TRACE process through the Aerospace Corporation, and a timeline for the next steps.



APAC thanks Drs. Harrison and Kennicutt for the valuable information they provided.

Recommendation

The committee also asks the APD to consider how the information that could be relevant for other Divisions (such as the state of the profession findings) could be shared with them.

JWST Update

Dr. Eric Smith provided an update on the JWST mission and described the progress that was made after the review and replan.

Finding

APAC noted that there is good progress being made in the mission and about 50% of the remaining items in the replan have been completed. However, the APAC was concerned that at the 50% mark, approximately 70% of the schedule margin has been used up and that there is only 2-month contingency left moving into the final stages of I&T and ATLO.

Recommendation

The committee would like to hear back in its upcoming meeting on the fairing depressurization remedy the JWST team implements with the launch provider, the success of the TWTA and CTA#2 swap-outs, as well as frequent updates on the schedule reserve.

Dual Anonymous Review

Dr. Neill Reid and Dr. Dan Evans shared with APAC the move toward dual anonymous reviews in proposal evaluation in Hubble proposals and in the Astrophysics Division GO/GI funding opportunities.

Finding

The committee recognizes the great effort invested dual-anonymous review division-wide and commends the astrophysics division for this undertaking. APAC recognizes that this move takes time and finds the cautious implementation of the dual anonymous process over several cycles to be sensible. APAC also notes the importance of educating the community for an effective implementation of this policy.

Recommendation

The committee recommends providing many opportunities for proposers to be trained in the submission of an anonymous proposal that meets the guidelines. Townhalls at AAS meetings as well as webinars would be an important component of this training.

APAC also notes the potential difficulty of implementing anonymity in programs that require long-term development of capabilities and techniques, such as lab astrophysics and theory programs involving large computational codes. The committee recognizes that the APD is already having discussions on how to best approach dual anonymous reviews in these areas and invites further discussion on the topic.

The committee also supports a “Dear Colleague” letter from Dr. Hertz to the community to explain the changes, the roadmap for implementation, and the training opportunities for the proposers.

R&A Update

Dr. Eric Smith provided the R&A update. He showed that the funding allocated to R&A has grown steadily in the recent years. In response to an earlier recommendation from APAC, FINESST fellowship



funding has also been doubled in the last cycle, with the selection rate increasing to 11% as a result. He described changes to the structure and funding of the XRP program.

Finding

The committee is pleased with the continued support of the R&A program and the increased levels of funding that have been sustained in the recent years. The program elements look balanced and the proposal selection rates are at reasonably healthy levels (with the exception of the XRP, which is lower than the other solicitations). The committee finds the increase in the FINESST selection rate to be a very positive development.

Recommendation

APAC requests a breakdown of the FINESST selected applicants in terms of laboratory astrophysics, observations, and theory areas.

APAC would also like to hear back in a year how the restructuring of the XRP will impact the proposal selection rates and other metrics for the program.

APAC supports Dr. Hertz's efforts to get a "Dear colleague" letter to the community for the Hubble fellowship program that explains the requirements to ensure that Hubble Fellows are offered employee benefits in their host institutions.

IXPE Update

Dr. Martin Weisskopf described the science objectives, the elements, and the milestones that have been reached in building the IXPE X-ray polarimetry mission. When launched, it will be the first of its kind in orbit.

Finding

The committee thanks Dr. Weisskopf for the description of progress to date and notes that it is on track. It does not see any notable obstacles or problems.

Recommendation

APAC would like to hear another update from IXPE when the mission is at the stage of integration.

WFIRST Update

Dr. Jeff Kruk presented to the committee the summary of progress in the past year. He described the addition of low-dispersion slitless prism optimized for supernova spectroscopy, which replaces the descoped Integral field channel in wide-field instrument. He also presented the schedule, which showed that the Preliminary Design Review coming to a close at the time of the APAC meeting.

Finding

APAC finds that the work on WFIRST is proceeding at a good rate, with several flight detectors delivered for evaluation, better thermal control of optics and baffle surfaces to enable meeting several level one requirements for science. The project is moving into a fiscal-year of peak spending and careful control of schedule to minimize cost is warranted. The committee also was pleased to hear that the project commits to providing the community with telemetry streams necessary to assess wave front sensor performance in anticipation of future integral field unit (IFU) technology development activities.

Recommendation



The APAC recommends the WFIRST project provide an update at its next meeting, including discussion of progress on coupled-load analysis and launch vehicle selection, and sensor status and performance characterization at its next meeting.

Sincerely,

A handwritten signature in blue ink that reads "Feryal Ozel". The signature is written in a cursive style with a small flourish at the beginning.

Feryal Ozel
APAC Chair
The University of Arizona

A handwritten signature in black ink that reads "Chick Woodward". The signature is written in a cursive style with a large, sweeping flourish at the end.

Chick Woodward
APAC Vice Chair
University of Minnesota

