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

Dear Paul,

The NASA Astrophysics Advisory Committee (APAC) held a teleconference on October 18 and 19. The following members of the APAC attended at least part of the meeting: Marshall (Mark) Bautz, Asantha Cooray, James (Jamie) J. Bock, Alan Boss, Patricia Boyd, Neil Cornish, Brenda Dingus, Scott Gaudi (APAC Chair), William (Bill) Jones, Jason Kalirai, Feryal Ozel (APAC Vice Chair), Paul Scowen, and Yun Wang. Hashima Hasan (APAC Executive Secretary) was also in attendance. Natalie Batalha, Debra Fischer, and Beth Willman were unable to attend.

Dr. Hasan opened the meeting by welcoming the APAC members, including the new member Bill Jones. She noted that a few APAC members had conflicts of interest with specific topics on the agenda. During those presentations, the conflicted members would be allowed to listen to the presentation, but they could not participate in discussion. Dr. Hasan then reviewed the Federal Advisory Committee Act (FACA) rules. Dr. Gaudi added that offline conversations cannot form the basis for APAC recommendations.

The agenda consisted of the following presentations:

- Astrophysics Division Update – Paul Hertz
- Summary of Hubble/Chandra Senior Reviews – Robert Milkey and Donald Kniffen
- James Webb Space Telescope Update – Eric Smith and Nikole Lewis
- Transiting Exoplanet Survey Satellite Update – George Ricker and Jeff Volosin
- Spitzer Space Telescope Update – Mike Werner and Lisa Storrie-Lombardi
- ExoPAG/PhysPAG/COPAG Updates – Alan Boss, Mark Bautz, and Paul Scowen
- R&A Update – Dan Evans
- Internal Scientist Funding Model Update – Dan Evans
- SMD Cubesats Program Update – Larry Kepko
- HEO Future Exploration Plans – Jason Crusan
- Technology Gap Update – Brendan Crill and Thai Pham
- NASA Airborne Astronomy Ambassadors Program – Dana Backman

The APAC would like to thank all of the presenters for their time.

In addition, the APAC discussed several additional topics that were not specifically on the agenda.

- APAC's response to SMD Associate Administrator Dr. Zurbuchen's charge with regards to high risk/high impact research.
- The impact of the suborbital program's response to the mishaps that occurred during the most recent Wanaka, Palestine and Ft. Sumner balloon campaigns.
- The potential impact of the House and Senate appropriations on the FY18 budget and how APD should respond to the funding shortfall that will likely occur should these get enacted.
- The proposed cancellation of the ROSES-2017 Strategic Astrophysics Technology (SAT) solicitation.
- The response of the Transiting Exoplanet Survey Satellite (TESS) team to our concerns about the focus issue and our request for additional information on the issue itself and its potential impact on the TESS science yield.

As these presentations will be available online, as will the minutes of the meeting and thus the discussions about these presentations and the additional topics mentioned above, we will not review them here, except as necessary to introduce our findings, recommendations, requests, and concerns.

Internal Scientist Funding Model

The APAC would like to thank Dan Evans for providing an update on this program, and in particular for being responsive to our requests for information and recommendations, and for providing the metrics and principles of the program.

Dr. Gaudi (APAC Chair) reported that he would convey the APAC response to the new ISFM model at the NAC Science Committee.

Request: The APAC would like to have an update at the appropriate time (likely the summer 2018 APAC meeting) on the implementation of the program.

Possible Extension of the Spitzer Space Telescope beyond March 2019

The APAC would like to the thank Mike Werner and Lisa Storrie-Lombardi for their presentations regarding the possible extension of Spitzer. We would like to acknowledge the enormous volunteer efforts of the coauthors of the white paper that discusses both the science impact and practicality of extending Spitzer observations. The committee notes the exciting and broad range of science that will be enabled by an extended Spitzer mission, both with Spitzer data itself, and the synergy with future missions and projects such as JWST, Euclid, WFIRST, LSST, and TESS.

Request: The APAC requests an update on the result of the recently-issued request for information (RFI) at the next APAC meeting, and will reopen the discussion of a possible Spitzer mission extension at that time.

The Transiting Exoplanet Survey Satellite (TESS)

The APAC would like to thank the TESS team for being responsive to our concerns about the focus issues and for providing an update on the status of these issues in their presentation. We are relieved that independent teams have concluded that the focus will not have a large effect on the science yield of TESS and will still allow TESS to achieve its Level 1 science requirement.

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Proposed Cancellation of the ROSES-2017 Strategic Astrophysics Technology (SAT) Solicitation.

The APAC is strongly opposed to 'surprise' changes in funding lines. The APAC expresses its appreciation to Paul Hertz for giving us the opportunity to weigh in on the possible cancellation of the ROSES-17 SAT call beforehand. We also recommend that we should be able to weigh in on future strategic decisions that may affect the division between the investment in mid-TRL technologies and low-TRL technologies, such as the Astrophysics Research and Analysis (APRA) Program

Recommendation: We recommend that NASA retain the ROSES-17 SAT call, and that any highly meritorious proposals from that call be funded out of the APRA funding line.

The James Webb Space Telescope (JWST)

The APAC would like to thank Eric Smith and Nikole Lewis for their presentations regarding JWST.

Request: The APAC requests an update on the progress of JWST at the next APAC meeting, and in particular a more refined estimate of the launch date if possible, as well as a report on how the specific launch date will impact the mission reserves.

Recommendation: The APAC is concerned with the lack of willingness to move the due date for the Cycle 1 proposal call, due to the possibility of the science getting 'stale' between the time of the solicitation and when the observations are carried out. We recommend that this decision be reconsidered.

High Risk/High Reward R&A Funding

The APAC generally agrees that APD tends to be somewhat too risk averse, and that there is therefore a need for a greater fraction of available funding for high risk/high reward programs in all areas, including technological, observational, and theoretical R&A programs. The APAC notes that in the case of technology funding, the APD R&A programs appear to be generally less risk averse, with the balloon and suborbital program being an excellent example. Nevertheless, the APAC felt that the other technology development programs that are part of APRA would benefit from a greater fraction of funding being awarded to high risk/high reward proposals; detector technology development was mentioned in particular.

The APAC recognizes the need to embrace a level of mission risk within the sub-orbital (balloon/rocket) and cubesat programs that is unacceptable in the orbital program. NASA's sub-orbital program has historically adopted such a posture, which has been a critical reason for the outsized scientific and technological impact of the program relative to its cost. This approach has also served to develop the skills needed to be effective Principle Investigators of future orbital missions.

In the case of observational and theoretical R&A programs, the APAC felt that the proposal selection panels and TACs tend to be conservative in ranking their proposals, unless there exist specific calls for more 'high risk' proposals (for example, specific calls for large proposals).

Recommendation: The APAC recommends that the APD find ways to fund high risk/high reward R&A at a higher level. However, the APAC did not reach consensus on the best way to achieve this. Some members suggested that APD create separate and explicitly advertised programs to fund such programs

(in all three areas), roughly at the level of ~10% of the total R&A budget, although the 10% fraction was considered notional. Others suggested a model in which each regular panel be directed to identify one or two high risk/high reward proposals that they would not otherwise select. The APAC imagines that this funding would come from existing programs, i.e., would constitute a small rebalancing from other programs.

However, the APAC would like to emphasize that these conclusions are preliminary and are not drawn from any attempt to systematically gather and synthesize input from the broader APD community.

Request: The APAC therefore would like to request additional time to gather input from the community before providing any final conclusions, in particular we would like to gather input from the community as to the level of support for high risk/high reward programs.

With regard to interdisciplinary, interdivisional, and crosscutting work, the APAC recognizes the clear potential for collaboration with the Human Exploration and Operations (HEO) Mission Directorate, particularly with regard to new launch capabilities, on-orbit space assembly, and the Deep Space Gateway. However, the APAC felt that we must have a more concrete understanding of what the benefits and costs will be to APD and the astrophysics community from collaborating with these programs.

Potential FY18 Funding Shortfall Resulting from Congressional Appropriations

Recommendation: Given the uncertainties in the timing of the finalization of FY18 budget, the shortfall amount (if any), and the amount of time that the APD will have to respond, the APAC recommends that Dr. Hertz attempt to minimize the science lost in the long term, while simultaneously maintaining the decadal survey priorities and the R&A program, to the best extent possible.

PAG Reports

Recommendation: The APAC closes out ExoPAG SAG 14: Characterization of Stars Targeted for NASA Exoplanet Missions.

Suborbital Program

Request: The APAC requests a report regarding the suborbital program's response to the mishaps that occurred during the most recent Wanaka, Palestine and Ft. Sumner balloon campaigns, and how those responses have impacted, or will impact launch rates, mission costs and science group operations going forward.

Request: The APAC also requests a report on the findings of the causes of the failure of the superpressure balloon flight from Wanaka, the Extreme Universe Space Observatory (EUSO) mission.

Sincerely,

Scott Gaudi
APAC Chair
The Ohio State University