

29 November 2018

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 22-23, 2018. The following members of the APAC attended the meeting: Marshall (Mark) Bautz (APAC Vice-Chair), Alan Boss, Laura Brenneman, John Conklin, Brenda Dingus, Debra Fischer, Hashima Hasan (APAC Executive Secretary), Kelly Holley-Bockelman, William Jones, Victoria (Vikki) Meadows, Leonidas Moustakas, Feryal Özel (APAC Chair), and Paul Scowen, Charles (Chick) Woodward. Asantha Cooray and Beth Willman were unable to attend.

Dr. Hasan opened the meeting by extending a welcome to our new member Chick Woodward, 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, 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 – Paul Hertz
- NASA Earth and Space Science Fellows Program – Stefan Immler
- James Webb Space Telescope Update – Eric Smith
- SOFIA Review Update – Kartik Sheth
- WFIRST Requirements – Jeff Kruk
- TESS Science Results – George Ricker
- ExoPAG/PhysPAG/COPAG Updates – Vikki Meadows, John Conklin, and Paul Scowen
- NAS Report on Exoplanet Science Strategy – David Charbonneau/Scott Gaudi
- NAS Report on Astrobiology Science Strategy – Barbara Sherwood Lollar/Alan Boss
- Integrated Technology Prioritization Process – Brendan Crill/Thai Pham

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

As a result of the presentations and discussions during the meeting, the APAC has the following findings and recommendations.

APD Report by Dr. Hertz



Dr. Paul Hertz presented science highlights, status updates from NASA astrophysics missions from the recent months, the Lunar Gateway program, and activities around NASA's 60th year celebration. He noted that the FY19 budget is awaiting congressional action.

In response to an earlier request from the APAC, Dr. Hertz reviewed the statistics from the first implementation of the NASA Internal Scientist Funding Model within the APD. He described the selection process for the programs, showed results that indicated that the fraction of funding that goes to NASA centers or the breadth of programs that are awarded as part of ROSES and SAT programs has not been impacted by the first cycle of ISFM implementation.

Finding

The APAC found these to be reassuring early outcomes on the ISFM implementation.

Recommendation

The APAC would like to continue to receive these updates on the statistics on potential impacts of the ISFM implementation on the competed programs in the coming cycles.

Dr. Hertz then talked about two commonly circulated "R&A Myths" that the APD quantitatively looked at. The APD found that, within the R&A program, neither expensive proposals (above average funding requests) nor high-risk high-impact proposals get penalized by review panels and that their selection rates are on par with – if not higher than – other proposals.

Dr. Hertz updated the APAC on the Explorer programs and the upcoming selection and solicitation timelines. **The APAC is very pleased that the APD and Dr. Hertz show continued support of the Explorers.**

The APAC was also very pleased to hear about the swift and successful recovery operations performed on the Hubble and Chandra space telescopes in the preceding weeks after they went into the safe mode (for different reasons on the two missions).

Finally, Dr. Hertz described the continuing preparations for the decadal survey, including the commissioning of the LCIT and PCAT teams for large mission concepts and probe concepts, respectively. Dr. Hertz concluded by reviewing the APAC recommendations from the last meeting. **The committee noted that all of the action items have been addressed or are being addressed in the present meeting.**

NESSF Program

In response to the earlier request from the APAC, Dr. Immler presented data on the NASA Earth and Space Fellows program. The request for information was in advance of a discussion of the fellowship program the APAC will take up in the spring 2019 meeting.

The APAC thanks Dr. Immler for compiling the requested information and for a very informative presentation.

The APAC also noted the following additional questions and would like to request an update on these items in the spring meeting.

- **How does the NESSF funding as a fraction of the total R&A budget compare across divisions?**
- **Do the advisors whose students receive NESSF tend to have other sources of NASA funding?**



- **What are the future career paths of NESSF fellows (if the APD has/can collect these data)? Do they end up with prestigious postdoctoral positions and successful careers within and outside of academia?**

JWST Update

Dr. Eric Smith provided an update on the JWST mission and conveyed that the new technical work was on schedule after the review and replan. He then responded to APAC's specific request to be briefed on the potential science impact of the delayed launch and how the science team plans to minimize that impact. Dr. Smith reported that the largest impact is likely to be decreased overlap with HST but that JWST will still have sufficient overlap with TESS and WFIRST. He also reported that the Exoplanet Program Analysis Group (ExoPAG) is studying how the delay affects that community.

APAC had also requested a "lessons learned" document to be prepared by the JWST team and shared with the community as soon as possible. Dr. Smith reported that such a document is being prepared but is not ready for sharing at the time of this meeting.

Recommendation

APAC requests a discussion of the Lessons Learned from JWST document during the Spring 2019 meeting.

SOFIA Review

Dr. Kartik Sheth provided an update on the technical and science review of the SOFIA mission. He explained that the Operations and Maintenance Efficiency Review is underway and that the terms of reference for the Science Review are being drafted.

APAC commends the APD for swiftly enabling a review of SOFIA after the mandate not to include SOFIA in senior review. The committee hopes that these reviews will help maximize the operations and the scientific productivity of the mission. The members also appreciate the opportunity to provide input to the ToR of the science review.

Recommendation

The committee would like to hear about the findings and recommendations of the operations and science reviews when they are completed.

WFIRST Update

Dr. Jeff Kruk presented to the committee a summary of how the Level 1 science objectives flow down to the mission requirements, drawing on the system requirements review conducted earlier in 2018. He also addressed concerns about the TRLs of specific elements, the impact of the reconfigured coronagraph, and the data volume.

APAC thanks Dr. Kruk for an informative presentation that carefully addressed how the science requirements are met in the current mission configuration and the plans for continued optimization in this direction.



TESS Science Results

APAC heard an exciting TESS science update from Dr. George Ricker. The committee was very pleased to find out that the mission is performing extremely well and that observations in the 4th field are underway. Dr. Ricker also described the planet search strategy for TESS and the possibility of an extended mission.

The committee thanks Dr. Ricker and is looking forward to continued science results.

CoPAG, ExoPAG, and PhysPAG Reports

Dr. Vikki Meadows reviewed recent ExoPAG activities and asked the APD for approval of the closeout of ExoPAG SAG 17 and the initiation of SAG 20. The APAC unanimously recommended approving these requests.

Dr. Conklin reviewed recent PhysPAG activities. He informed the committee that the committee was seeking new members on the executive committee. He updated the committee on the Multimessenger Astrophysics SAG and the involvement of PhysPAG in the Great Observatories SAG initiated by COPAG. There were no actions or recommendations resulting from this presentation.

Dr. Scowen reported on the membership of the executive committee and the recent activities of COPAG. He also brought up a discussion, on behalf of all three PAG chairs, of the capacity of the PAGs to initiate and to organize community white papers in response to the decadal survey request. All PAG chairs and the APAC took part in this discussion.

Following this discussion, **APAC and Dr. Hertz expressed a joint understanding of the role of the PAGs in the decadal survey white paper process, in which the SAGs can facilitate, via meetings and group organizations, the community to produce white papers on topics of interest to the SAG membership but that the PAGs do not directly author white papers. APAC also requested a policy statement from Dr. Hertz on this subject.**

NAS Report on Exoplanet Science Strategy

The APAC heard a presentation from Dr. Charbonneau and Dr. Gaudi on the recently completed Exoplanet Science Strategy Report requested by NAS. They described the task, the process by which the committee gathered input, and the recommendations of the committee.

Of direct relevance to NASA, the committee found that a space-based exoplanet imaging mission is needed to measure reflected light spectra of temperate terrestrial planets orbiting sun-like stars is a high long-term priority. They also called on NSF to support instrumentation as well as ground-based radial velocity observations coordinated with space observations to obtain precise mass measurements of terrestrial planets around sun-like stars.

The APAC thanks Drs. Charbonneau and Gaudi for their informative presentation. The committee asks the APD to notify APAC of how they will respond to these recommendations in the short term and which items they think should wait for the recommendations of the 2020 decadal survey.

NAS Report on Astrobiology Science Strategy

Dr. Barbara Sherwood Lollar and Dr. Alan Boss presented the findings and recommendations of the NAS Astrobiology Science Strategy Report to APAC. The three key findings were go broad, go deep, and go high-contrast in the searches. She also discussed the need for cross-divisional collaboration within NASA to enable advances in astrobiology as well as a need for support for enabling technologies.



The APAC recommends that NASA technology programs prioritize any technologies that the ExoPAG identifies as high-priority enabling technologies that are needed for searches for biosignatures.

Integrated Technology Prioritization Process

Dr. Brendan Crill provided a presentation to the APAC on the new integrated technology prioritization process. The new approach involves a joint solicitation of technology gaps from the community and a coordinated prioritization of the technology gaps through the program offices in order to facilitate mature technologies for future strategic missions.

APAC thanks Dr. Crill for his informative presentation and requests an update in one year about the balance achieved between the different programs during the first implementation of the integrated process.

Mission Cost Caps

APAC had requested data on the costs of missions over time in order to assess whether the current cost caps in different mission categories still adequately address current scientific needs and priorities. Dr. Michael New presented data he collected from publicly available AOs, adjusted for inflation and corrected for launch vehicle costs. The caps appeared to be flat over the past decade with these adjustments. APAC was also made aware of a similar study that the CAA has undertaken.

APAC thanks Dr. New for his presentation. The committee has agreed to read the CAA report before deciding whether to take on a full discussion of this topic during the next meeting.

Other

APAC is moving forward with plans to solicit input from the community via the PAGs regarding any cross-divisional barriers to research. This topic was discussed in the July meeting of the committee.

Sincerely,



Feryal Ozel
APAC Chair
The University of Arizona

Mark Bautz
APAC Vice Chair
MIT

