



HELIOPHYSICS ADVISORY COMMITTEE (HPAC)

REPORT TO NASA HQ HELIOPHYSICS DIVISION

FROM THE MAY 5-6 2022 HPAC MEETING

SUMMARY OF THE MAY 5-6 HPAC MEETING

- Convened virtually on Thursday and Friday, May 5-6, 2022
- All HPAC members were present (see next slide for membership list)
- Designated Federal Officers (DFO), of NASA-HPD
 - Dr. Janet Kozyra and Dr. Kelly Korreck
- Presentations to HPAC:
 - Space Weather Council update, Ms. Patricia Doherty, Space Weather Council Chair
 - R&A Program Trends, Dr. Pat Koehn
 - Division Update, Dr. Nicola Fox
 - DEIA Efforts, Ms. Denise Hill and Dr. Kelly Korreck
 - Living With a Star Program Analysis Group (LPAG), Dr. Anthea Coster, LPAG Chair
 - LWS Architecture Committee, Dr. Christina Cohen, chair
- HPAC thanks all of the speakers for their time and effort preparing material for this meeting
- We welcome any requests from NASA Heliophysics Division for clarification or elaboration on our findings and recommendations.

HPAC MEMBERS PRESENT

- All members of HPAC were present
 - Aroh Barjatya (Embry-Riddle Aeronautical University)
 - Rebecca Bishop (The Aerospace Corporation)
 - Paul Cassak (West Virginia University)
 - Patricia Doherty (Boston College, Space Weather Council chair)
 - Matina Gkioulidou (Johns Hopkins University Applied Physics Laboratory)
 - Larisa Goncharenko (Massachusetts Institute of Technology Haystack Observatory)
 - Allison Jaynes (University of Iowa)
 - James Klimchuk (NASA Goddard Space Flight Center)
 - Therese Moretto Jorgensen (NASA Ames Research Center, vice chair)
 - Michael Liemohn (University of Michigan, chair)
 - Tomoko Matsuo (University of Colorado)
 - Mari Paz Miralles (Smithsonian Astrophysical Observatory)
 - Cora Randall (University of Colorado, Boulder)
 - Kristin Simunac (St. Petersburg College)

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- Recommendation on Allocations and Trends in Research and Analysis Funding
- Finding on Heliophysics Observatories
- Finding on the Geospace Dynamics Constellation Mission
- Finding and Recommendation on the DYNAMIC Mission
- Finding on Community Engagement and Long-Term Planning
- Finding and Recommendation on Open Data and Open Software
- Finding and Recommendation on IDEA actions within HPD
- Recommendation on Space Weather Council Actions and Directions

RECOMMENDATION ON ALLOCATIONS AND TRENDS IN RESEARCH AND ANALYSIS FUNDING (1 OF 2)

Background:

Research and Analysis (R&A) – data analysis, theoretical research, modeling, and technology development – are vitally important to NASA. They turn observations from NASA missions into new scientific understanding, and they provide the ideas and technologies that are the motivation for new missions. A healthy R&A program includes both open research opportunities, where the next great breakthroughs are incubated, and directed research into specific areas identified as important and ripe for advancement. It is crucial that investments in R&A be aligned with priorities. Given the challenges of assessing funding awards from publicly accessible records, it is difficult to know whether this is currently the case. It is also difficult to know whether trends in funding are consistent with community priorities or with the perceptions of the community or even NASA Headquarters itself.

RECOMMENDATION ON ALLOCATIONS AND TRENDS IN RESEARCH AND ANALYSIS FUNDING (2 OF 2)

Recommendation:

We therefore request a detailed analysis of the R&A budget and its trends. We wish to know the budgets of the individual R&A programs. We request that they be subdivided into traditional R&A (data analysis, theory, and modeling) and technology development. They should be further subdivided into open programs (e.g., Heliophysics Supporting Research, HSR; open Guest Investigator, HGI) and directed programs (e.g., Living With a Star Focused Science Topics, LWS FST; HGI programs attached to specific missions; Space Weather Research to Operations to Research, SWR2O2R). This means four distinct categories. To identify trends, we would like the information presented by year for at least the past five years and preferably longer. It would be helpful to have the numbers in both real and inflated dollars. We request that the information be provided in both graphic and tabular form, and we request that this be standard information provided to HPAC on an annual basis going forward. We specifically request a spreadsheet version, so the categorizations can be modified for further insights. We understand that this takes significant effort by the Heliophysics Division, but we feel it is so important that the effort is warranted.

FINDING ON HELIOPHYSICS OBSERVATORIES

The HPAC would like to congratulate HPD on the exciting and growing number of Heliophysics observatories. It is very exciting to see the continued momentum to deploy both complementary and novel missions that are exploring various parts of the solar and near-Earth space environments. The large variation of observatory types ranging from continuing missions, near-term CubeSat missions, missions of opportunity, and future constellations (e.g., GDC), ensures the vitality of HPD science, the participation of a large swath of the community, and provides exciting future opportunities including DEI and new PI participation.

FINDING ON THE GEOSPACE DYNAMICS CONSTELLATION MISSION

HPAC commends HPD on its progress towards implementation of the GDC mission and is excited to see the science that would be enabled by this long-awaited flagship mission. The development of this mission took the approach of first identifying the physical parameters that would achieve the science objectives, and then evaluating the spacecraft implementation strategy, without first specifying the measurement strategy. We are interested to hear from HPD how this process went relative to the more traditional approach of developing the measurement strategy in parallel with the spacecraft implementation strategy.

We would like to express our confidence in the independent review board to make a judicious assessment of the process thus far.

This mission has an incredible opportunity to nurture the field and a whole new generation of instrument scientists. We look forward to hearing from HPD about the process, the results of the IRB, and further developments of this large and important flagship mission of the HPD portfolio.

FINDING AND RECOMMENDATION ON THE DYNAMIC MISSION (1 OF 2)

Finding:

The HPAC is disappointed that DYNAMIC is not included in the FY23 President's budget request (PBR) due to budget constraints, even though it was a priority of the last Decadal Survey. DYNAMIC, in particular its coordinated implementation with GDC, is broadly supported by the Heliophysics research community. DYNAMIC is expected to fill the key gaps in top-ranked space weather observation and research priorities, with tangible impacts on space domain awareness and space traffic management.

FINDING AND RECOMMENDATION ON THE DYNAMIC MISSION (2 OF 2)

Recommendation:

We anticipate that the community will be discouraged when hearing that DYNAMIC is not in the FY23 PBR. In addition, it is not clear if DYNAMIC mission pre-formulation activities will be automatically restored if the budget issue is resolved. We are also concerned that the uncertainty about DYNAMIC might negatively affect the community's activities to prepare white papers for the upcoming Decadal Survey. We recommend that NASA address these concerns when sending out the planned community announcement about DYNAMIC not being included in the PBR.

FINDING ON COMMUNITY ENGAGEMENT AND LONG-TERM PLANNING

HPAC would like to applaud the overall sustained effort and success of future planning activities undertaken by the Heliophysics Division over the past year, especially considering the challenging COVID environment. Additionally, we want to strongly commend HPD's community engagement efforts as part of future planning activities such as the LWS internal planning, and the Heliophysics 2050 workshop. Further, we are pleased to see the growing list of near-term missions involving the coordination with international partners. The HPAC appreciates HPD's continued investment in the workforce development and is pleased to learn about increase in the number of funded Jack Eddy Fellowships. All of the above endeavors have already begun and will have significant positive impacts on the entire scientific community.

FINDING AND RECOMMENDATION ON OPEN DATA AND OPEN SOFTWARE (1 OF 2)

Finding:

It is clear to HPAC that HPD has spent significant effort in developing the HPD policy for open data and open software (see document “Heliophysics Division Science Data Management Policy, Feb. 14, 2022) and development of mechanisms and tools for NASA missions to transition data and software. In order to improve the community’s buy-in of the newly implemented HPD policy, it is critical to provide an end-to-end demonstration on how the high-level agency strategy, HPD policy, and HPD implementation may impact individual mission and project tasks, as well as the activities of individual scientist. However, the actual implementation details within HPD specifically remain less clear.

FINDING AND RECOMMENDATION ON OPEN DATA AND OPEN SOFTWARE (2 OF 2)

Recommendation:

HPAC recommends HPD increase the dissemination of the recently released HPD policy and the dissemination of the HPD implementation plan along with soliciting community implementation input as soon as reasonable. Further, providing more opportunities for the community to participate in the formulation of the implementation plan through workshops or advisory groups would be desirable. HPAC requests an update on the results of including specific open data and open software-oriented requirements in the ROSES programs, especially focusing on the successes and challenges of each program related to the new policy.

FINDING AND RECOMMENDATION ON IDEA ACTIONS WITHIN HPD (1 OF 2)

Finding:

- HPAC commends HPD for current and upcoming inclusion, diversity, equity, and accessibility (IDEA) efforts, and the plans to evaluate what is (or is not) working and what else is needed.
- We suggest that suborbital platforms and other low-cost platforms could be a means to attract historically underrepresented or excluded populations.
- We identify that bridging the gap in professional development from low-cost platforms to larger-scale missions and supporting those in the early to mid-career phase is an important need.

FINDING AND RECOMMENDATION ON IDEA ACTIONS WITHIN HPD (2 OF 2)

Recommendation:

- We recommend continued efforts to identify mechanisms to incorporate systematic IDEA efforts into all HPD activities, such as conducting implicit bias training before review panelists and ad hoc reviewers are given proposals to review.
- HPAC has received this open letter (<https://tinyurl.com/DEIopenletter>) written by members of the CEDAR and GEM communities to urge the agencies to be more forthright about incorporating IDEA actions into multiple aspects of their activities at an institutional level. Although we did not have a chance to deliberate specific concerns expressed in the letter, HPAC recommends that HPD consider the community concerns expressed in the letter in the IDEA policy action plans.
- We recommend efforts to identify how to reach people who have left the Heliophysics community or feel unable to participate for their input.
- IDEA updates at future HPAC meetings are requested. For example, HPAC would like to hear results of the study of the use of pronouns in official communications.

RECOMMENDATION ON SPACE WEATHER COUNCIL ACTIONS AND DIRECTIONS (1 OF 2)

Background:

- The Space Weather Council (SWC) was established as a means to secure the counsel of community experts across diverse areas, on matters relevant to space weather in support of NASA's Heliophysics Division.
- The SWC is a standing committee of the HPAC. It reports to and is responsive to actions levied by the HPAC.
- There are two other active space weather committees already in operation. They include SWORM (Space Weather Operations, Research and Mitigation Subcommittee) and SWAG (Space Weather Advisory Group). SWORM is a Federal coordinating body organized under the National Science and Technology Council (NSTC) Committee on Homeland and National Security, organized under the Office of Science and Technology Policy (OSTP). The SWORM coordinates Federal Government department and agency activities to meet the goals and objectives specified in the National Space Weather Strategy Action Plan released in March 2019. SWAG was established on April 21, 2021, pursuant to the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) act of 2020. The mission of the advisory group is to receive advice from academia, the commercial space weather sector, and space weather end users to advise SWORM.
- **With the establishment of the NASA Space Weather Council, it is important for this group to define its role in support of NASA HPD interests and to determine how best to complement the activities of the SWORM and SWAG.**

RECOMMENDATION ON SPACE WEATHER COUNCIL ACTIONS AND DIRECTIONS (2 OF 2)

The HPAC recommends the following actions for the SWC:

1. SWC is advised to research the activities of SWARM and SWAG, identify overlaps and gaps, and determine how SWC can complement and leverage ongoing efforts, with specific relevance to the interests of the NASA Heliophysics Division. This may include researching reports on the committee websites; attending their public meetings; organizing a meeting of committee chairs and staff; and defining how the role of the SWC can complement the work of these existing committees.
2. Of specific interest to the HPD and HPAC is an analysis of the gaps in space weather fundamental science, modeling and impacts. Gap analysis studies have been performed by different agencies within the last decade, and a summary review of this material is of importance for HPD future plans. Specifically, the HPD supports development of a range of instruments at different technology readiness levels. Up-to-date understanding of knowledge gaps will assure that HPD can make an informed decision in prioritizing development of certain technologies, instruments, and models.
3. The SWC is advised to address the NASA's ARTEMIS and space biology programs to determine the potential to extend our knowledge with lunar focused space weather measurements and studies.
4. The SWC is advised to work on the development of specific suggestions for interagency NASA-NOAA-NSF-DoD cooperation in order to maximize return on investment in research infrastructure supported by agencies. Specific examples include development of suggestions about better coordination between NASA and NOAA supported space-based instruments and NSF-supported ground-based infrastructure, data fusion from multiple instruments, data assimilation efforts, etc.