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MEETING MINUTES

Paul Cassak, Chair

Janet Kozyra, Executive Secretary

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Welcome

Dr. Janet Kozyra, Designated Federal Officer (DFO) and Executive Secretary for NASA's Heliophysics Advisory Committee (HPAC), opened the meeting, which began a few minutes late due to technical issues. While waiting, Dr. Joseph Westlake, the new Director of NASA's Heliophysics Division (HPD), thanked everyone for participating and providing input.

Dr. Kozyra said that this was the first day of a two-day meeting. She then turned the meeting over to Dr. Paul Cassak, HPAC Chair.

Introduction of Committee Members; Overview of Agenda

Dr. Cassak conducted roll and determined that all Committee members were present, either in-person or virtually. He then reviewed the agenda before turning to the first presenter, Dr. Westlake.

Heliophysics Division Update

Dr. Westlake noted that there would be an opportunity for members of the public to speak on the second day of the meeting. As the meeting opened, he had been director for just shy of 3 weeks, so most of his presentation would reflect what had been done before he arrived. He thanked Ms. Peg Luce, Deputy Division Director, for her work, as well as Ms. Nicole Rayl, Associate Director for Flight, and Dr. Therese Moretto Jorgensen, the Transition Advisor.

NASA Heliophysics has three primary objectives:

- Solve fundamental physics questions of heliophysics;
- Build the knowledge to forecast space weather; and
- Understand our linkages within space.

Dr. Westlake would like to know if there is anything not covered by these.

At the previous HPAC meeting, in November 2023, the Committee generated a number of findings and recommendations. HPD was still working on most of these, but Dr. Westlake had responses to two of them. First was about the transition of certain missions to Heliophysics System Observatory (HSO) infrastructure status. This has generated concern within the science community and HPAC recommended that HPD communicate more specifically about what this entails and its impact. Dr. Westlake said that HPD has heard these concerns and is revamping its strategy. There was also a question about Research and Analysis (R&A) funding. HPAC recommended that HPD provide the community with more information about its decision making rules, guidelines and rationale used to determine priorities within the HPD budget. Dr. Westlake emphasized that R&A is an HPD priority. The next Decadal Survey (DS) should be issued within the next several months and he expects to see some additional guidance on this. A chart showing the HPD budget history indicates that R&A is essentially flat in real dollars. It is true that inflation is a factor, but the President's Budget Requests (PBRs) going forward are all flat.

Dr. Westlake turned to the HPD mission suite. A timeline through late 2025 showed eight planned launches. In the area of mission highlights, the Carruthers Geocorona Observatory (Carruthers) and the Electrojet Zeeman Imaging Explorer (EZIE) are two small but powerful missions; the latter has yet to launch. The Atmospheric Waves Experiment (AWE) went to the International Space Station (ISS) in 2023 as part of an effort to understand the space and atmospheric interface. The Tandem Reconnection

and Cusp Electrodynamics Reconnaissance Satellites (TRACERS) mission is in integration. This effort will look at the connection of the cusp outward. The Interstellar Mapping and Acceleration Probe (IMAP) is also in integration and the mission webpage has a link for viewing a livestream of the work.

A recent effort to help members of the heliophysics community share their work is the "science nuggets" initiative, which is essentially science storytelling that HPD wants to share within the NASA Science Mission Directorate (SMD) and the broader community. These monthly highlights consist of science results and captivating images that can be easily shared. Dr. Westlake encouraged the heliophysics community to participate. He gave the example of a paper on the dark halos around active regions in the solar atmosphere. The science nuggets should be sent to the HPD program scientists and to Ms. Denise Hill, who leads the Division's communications.

There are many missions within the HSO, and HPD must balance these against new missions. The budget is a key factor. At the same time, HPD wants to encourage: competitive science; Inclusion, Diversity, Equity, and Accessibility (IDEA) in the missions; and further scientific progress. HPD recently completed its 2023 Senior Review (SR), which is done every 3 years to evaluate missions in extended operations. The SR is a huge effort, and in order to make it more manageable, HPD came up with the idea of moving some extended missions into the infrastructure category. However, this was widely panned by the heliophysics community. Therefore, the Division was working on revising the infrastructure concept, and Dr. Westlake cautioned that anything he said about that at this meeting was not yet final. He would like feedback, comments, suggestions, etc. The goal of the infrastructure category was to get some missions into a continuously operating state in which they deliver science in a way that the community can always use. In this scenario, active competitions would allow new researchers access to the data. It would also enable scientists already on the missions to do science in an engaging way. Nonetheless, the word "infrastructure" was actively disliked. The SR recommended developing opportunities for HSO science working groups, expanding the Guest Investigators (GI) program, and strengthening community frameworks to better connect with the Heliophysics Digital Resources Library (HDRL). Because the infrastructure concept was not appreciated, HPD will revisit it and send out ideas to the community in the next couple of months via town halls.

Dr. Westlake next discussed R&A. The Research Opportunities in Space and Earth Science (ROSES) 2023 solicitation for heliophysics includes the new Technology Program and the Space Weather Program (SWxP), along with a number of programs across SMD divisions. He would like community feedback on the cross-divisional access. R&A is an entry point for many researchers.

Recent space weather activities include the signing of the Memorandum of Agreement for Space Weather Research-To-Operations-To-Research Collaboration (Quad Agency MOA). Signatories included NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the U.S. Air Force (USAF). Among other space weather activities is the release of the first end-to-end Table Top Exercise (TTX). The actual exercise will take place at the Applied Physics Lab (APL) in May, with the goal of enhancing our understanding of future impacts of solar activity.

The new Heliophysics Strategic Technology Office (HESTO) helps manage the HPD Technology Program and works closely with the sounding rocket and balloon programs. HESTO is modeled after an Earth Science Division (ESD) program and provides a means of examining gaps and trends.

SMD has set strategic priorities for IDEA. Like the other divisions, HPD draws from the larger program, which includes: the SMD Bridge Program to develop partnerships with historically under-resourced institutions; the PI Launchpad, to support new proposers; and adoption of Dual Anonymous Peer Review (DAPR) to help ensure fair evaluation of proposals.

As noted, the National Academies of Sciences, Engineering, and Medicine (NASEM) is working on the Heliophysics DS, which is likely to be published in the late summer or early fall. HPD looks forward to receiving it and move forward on the recommendations.

Another HPD activity is the Heliophysics Big Year. This is a unique opportunity for the heliophysics community to engage with the public and other science disciplines. The Big Year started with 2023's annular solar eclipse and is moving toward the full solar eclipse on April 8, ending in late 2024 with Parker Solar Probe (PSP) approaching the sun. Dr. Westlake encouraged everyone to engage in this effort and promote it in the broader community through these events. The Big Year has a different theme each month in order to facilitate engagement with the broader community; the February 2024 theme was "fashion," which has much room for creativity and innovative ideas. The timing is such that the Big Year is coinciding with the solar maximum, which is accompanied by many events such as coronal mass ejections (CMEs), sunspots, aurora, and more. It is still unclear where we are in regard to the maximum, as it has been an unusual solar cycle thus far. A lot of missions, including sounding rockets, will be doing amazing things during this maximum.

Q&A
Dr. Matina Gkioulidou said that with the infrastructure missions, more than just the name is unfortunate. It is important to decide how HPD addresses the budget and how the Division helps people adjust to the realities. Dr. Westlake said that HPD does not want missions firing their scientists. The missions are HPD's lifeblood. It is important to look at where the science funding comes from, and whether NASA funds the mission teams or the R&A. It will be both, but HPD wants to encourage consistency in the missions while opening up competition and the science teams. Money is something HPD struggles with. Currently, funding goes to each mission individually. If money were pulled from each, it would go to R&A, but it is not clear how that would work. SMD has lost $1 billion dollars in funding, so NASA science will be struggling. Dr. Gkioulidou said she is hearing that the early career (EC) people are being hurt. Dr. Westlake replied that HPD has more capability to allow for IDEA to come into selections. That is inconsistent across missions, while R&A is more consistent. If HPD were to cut back on science funding for missions, a question is who it would affect. EC and diversity goals are closely linked. IDEA cannot be a selection criterion, but inclusion plans are part of the ROSES solicitation requirements.

Dr. Lisa Upton said that it is very concerning to see that R&A funding remains flat despite inflation. She asked what HPD is doing to advocate for gains, and what HPAC and the public might do. Dr. Westlake pointed out that civil servants and government entities cannot advocate. However, everyone in the science community can accurately communicate the importance of their science and what is being done. The science nuggets and such give him an opportunity to display this importance. If there were more funding, HPD would love to support R&A more robustly. The PBR has specific line items, including R&A, and this illustrates some of the constraints.

Dr. Cassak asked about HPD keeping pace with other SMD divisions. Dr. Westlake said that HPD has never gotten more funding by comparing itself to other divisions, and it largely follows the SMD ebb and flow. HPD has a lot of cross-agency activities that help in that regard. Dr. Eric Zirnstein noted that regardless of the budget, there are different sizes and scales of R&A opportunities, with some being large and others small. Dr. Westlake said that this reflects DS advice. If the new DS wants to open it up more, R&A will address that. The decision to put together teams versus individual proposals is something he would like feedback on, specifically in regard to the Diversify, Realize, Integrate, Venture, Educate (DRIVE) centers.

Dr. Cassak asked for Dr. Westlake's impression of the funding balance of the Division's portfolio going forward. Dr. Westlake replied that much of budget is in the missions. If there are not launches to follow the current set of missions in development, the cadence will suffer and HPD will struggle to do new

things. There is also a need to address aging missions and respond to the DS. If the DS calls for a large flagship mission, that will require hard decisions. The large strategic missions have been an important part of HPD success.

Dr. Jia Yue was concerned about the selection rates in R&A, specifically in Heliophysics Supporting Research (HSR). The rate of 14 percent this year was low. Dr. Westlake agreed. There were 161 proposals in response to the latest HSR solicitation, which is an unusually high number, but the selection rate is frustrating whatever the cause. Dr. David Brain asked about the bar chart for the budget. Dr. Westlake said that while the budget history is slightly greater than inflation in real dollars, the de facto budget due to inflation is not keeping pace. Dr. Brain then asked about the format for the science nuggets. Dr. Westlake said that while HPD could provide a template, he does not want people to worry about formatting. Dr. Brain observed that another division makes this kind of thing much more complicated, and he feels the HPD approach is better. Dr. Westlake said that the goal is to have the nuggets used, so he does not want people to spend time on formatting or for this to become a barrier to entry.

Dr. Laura Peticolas asked if the Quad Agency signatories of the space weather MOA are also collaborating on communication and coordination with the larger community. Ms. Hill said that there have been a couple of efforts and people should reach out to her with ideas and opportunities. Dr. Farzad Kamalabadi said that it would be helpful to HPAC if HPD were to link the three overarching objectives Dr. Westlake presented with specific parts of the portfolio. Dr. Westlake said that much of this originates with the DS. If HPAC sees an imbalance, he would like to know, as the members represent a large cross-section of the community and he takes their feedback seriously. In any event, each program and each project supports one of the objectives. Much of the portfolio is informed by the budget as well, and that often constrains the Division's ability to make changes. The priorities are to support missions, science, R&A, and the rest of the portfolio. The PBR incorporates significant detail regarding priorities.

Dr. Cassak asked if the layoffs at the Jet Propulsion Lab (JPL) would affect heliophysics. Dr. Westlake said that everyone feels for their JPL colleagues. The budgetary constraints there have not affected any HPD missions. However, it is very challenging for JPL and there are challenges within SMD. Dr. Cassak said that in regard to IDEA, he has heard from the community that the Heliophysics Internal Science Funding Model (HISFM) review has been a move away from IDEA. Dr. Westlake said there has been an effort to open it up, and the reviews should be consistent for those in and out of government. Dr. Reiner Friedel of HPD explained that HISFM is being redesigned. The Step 1 proposal is a preliminary step to avoid wasting people's time. Step 2 has peer review. He can speak to HPAC in the future if they want.

Dr. Zirnstein asked about rebalancing R&A funding to allow for more consistent selection rates. Dr. Westlake said that the budget generally dictates how different R&A programs are funded. The selection rate results from proposal pressure and budget. To rebalance, HPD would need to pull funding from other programs. HSR has the greatest proposal pressure. If the community wants more selections, he welcomes that feedback. R&A is strategic but NASA is not operating in isolation, as the program scientists work together to maximize high-quality selections. Dr. Patrick Koehn said that HSR 2023 had 161 proposals, about 33 percent more than the previous round.

Dr. Peticolas observed that the restructuring discussed in the SR could be making it hard for teams to continue their science. She wondered if some of those team members are turning to HSR. Dr. Westlake said that most R&A areas have been on a downward trend in terms of proposals, and there has been a dip in proposal pressure since 2020. While HPD did hear about the possibility it would go up, the budget timeline is long and set well in advance, which affects the Division's ability to maneuver. Ms. Luce said that she wanted to correct a misconception. HPD is not taking money from any operating missions as a result of the SR. But not all of the science the mission teams want to do is fundable. Many missions have supplemented their teams with proposal work. Extended missions sustain great science and science data,

but the SR looks at whether the HPD budget provides enough to do the best science with that data, while also making space for new ideas and projects. The SR only cut one project, which did not come in well. Dr. Gkioulidou expressed a wish to have the PIs appear at HPAC meetings because of occasional mixed messages. She hears that EC people are being affected, and clearly something is not being communicated. Ms. Luce pointed out that HPD has not yet implemented what was discussed at the SR. People are understandably afraid, but nothing has happened yet. Budgets are constrained. There is fear and a need for more communication.

Discussion about Potential Ways for HPAC to Take a Deeper Dive into Some Issues

Dr. Cassak said that he has been on HPAC for 6 and a half years, but some members were new, so this was an opportunity to discuss how HPAC operates. He wanted to talk about what they might do to give more measured advice. One thought was to have subgroups take deeper dives into hot-button issues, but he was not sure how it would work given the legal constraints that discussion be public. Dr. Westlake said that the primary way HPAC has to ask for deeper dives is through the agenda, so it would help to have information about what the Committee wants prior to the next meeting. Dr. Kamalabadi observed that much of the information presented at the meetings comes from HPD, but HPAC would also benefit from hearing about targeted areas where HPD could use community feedback. Dr. Cassak said that sometimes this happens behind the scenes in setting the agenda.

Dr. Brain thought that discussion was curtailed at the previous meeting due to the packed agenda. He suggested limiting the number of topics and sending out information in advance. Dr. Upton agreed. She wondered if subgroups could do research between meetings, with an online area to organize the work. The agenda might select some of this research to present. Dr. Kozyra said that HPAC can gather information in advance but discussion and decision-making must be done in a public forum. Dr. Westlake agreed, noting that other committees use things like Google Docs to collect information and put forward common themes. He suggested contacting the chair of the Planetary Science Advisory Committee (PAC). Dr. Zirnstein endorsed Dr. Upton's idea. Dr. Aroh Barjatya agreed and wondered if a Google Docs folder might have one section for the public and another for the Committee. Dr. Kozyra said that any discussion must be in a public forum, but Google Docs is a Wiki and does not have to be open. Advice and discussion leading to advice must be public.

Dr. Christoph Englert asked if there might be a way to obtain metrics from across the community. Dr. Westlake replied that the community has many venues for feedback, such as town halls. This might not be the best use of HPAC time. It would be burdensome for HPAC to create a system that makes all comments flow through it. Town hall feedback is anonymous, allowing those who are less outspoken to provide input. Dr. Upton asked if there is a summary report HPAC could get from the town hall comments. Dr. Westlake said that the comments are addressed in real time, but recordings are made available. Dr. Cassak reminded the members that any work they do outside of the meeting is a time commitment. Dr. Kamalabadi said that it would be most efficient to hear from HPD since HPAC advises them. He wants to know what is most helpful. Dr. Westlake said the Division would be more intentional on forming the agenda. Dr. Barjatya advised having fewer items on the agenda, and others agreed. There was also consensus that they should discuss what they want to include on the next agenda. Dr. Cassak said that this was not a finding per se, and HPAC would try this approach.

Discussion and Comments on Space Weather Council (SWC) Report

Dr. Nicola Fox, SMD Associate Administrator (AA), dropped in to say that she appreciated the time and effort HPAC was putting in. NASA is deep in negotiating for the FY25 PBR. She thanked the members for their input and asked that they to take this to the community.

Dr. Cassak then said that SWC produced a report in their May 2023 meeting, and HPAC needed to decide what to do with it, such as send it to HPD or ask for more information. Dr. Nicole Duncan, SWC Chair,

said that while she did not want to repeat the overview from the previous meeting, she did have a few slides as a refresher. SWC planned to meet the next week. It is a community-based forum to provide input and advice to NASA through HPAC, to which it reports. She then reviewed the charter. There are a number of space weather groups within the Federal government, and SWC's first task was to identify the distinctions between each, with an eye toward coordination. The coordination has been successful, with key aspects being cross-membership, regular chair tag-ups, staying within the respective charters, and sharing information. The second SWC task was gap analyses. The Council determined that observational and infrastructure gaps are well-understood, and recommended a gap-filling analysis with quantified return on investment (ROI). There is an urgent need to do a gap-filling analysis for exploration, and SWC also recommended that there be a modeling gap analysis.

The third task had to do with the Artemis mission and space biology. SWC sees a lot of opportunity in the Moon-to-Mars (M2M) program and would like HPD to help support the validation efforts. The fourth and final task addressed cooperation and the space weather research-to-operations-to-research (R2O2R) process. The Council found a need for a space weather data portal, strong connections between the Department of Defense (DoD) and the civil side in addressing gaps, and partnerships that anticipate need.

All of these are covered in the 45-page report, and SWC sought HPAC's feedback. Dr. Kamalabadi asked about the anticipated use of the report. Dr. Duncan explained that HPAC would decide whether to pass it to Dr. Westlake. Dr. Cassak added that as a subcommittee of HPAC, SWC can only report to HPAC. The Committee was to decide whether to move the report forward. Dr. Duncan said that once it is passed on, the goal would be to have the community weigh in on whether the gap analysis is sufficient. Ideally, there would be no need for a further gap analysis. Dr. Kamalabadi said that years ago, the Office of Science and Technology Policy (OSTP) created detailed benchmarks that defined space weather needs. Dr. Duncan said that SWC did not conduct its own gap analysis, but instead reviewed existing ones from NASA and elsewhere, and determined that the major gaps for science and applications are well-understood. The report does not go into specific missions and only deals with NASA efforts.

Dr. Peticolas found this very helpful. When she sees DOD interest in NASA modeling, it has a big learning curve. She wondered where that conversation is. Dr. Duncan explained that SWC just identified that there is potential for collaboration. Dr. Cassak thought the report was thorough and warranted forwarding to HPD. Dr. Peticolas agreed. She asked if HPAC was to evaluate it as a whole or in pieces. Dr. Cassak said that it was the former, and this was the time to raise concerns about sections. If there were unmet needs, they could send it back. Dr. Upton said she supported passing it to HPD. Dr. Zirnstein agreed. Dr. Cassak said that while there was no need for a formal vote, the members did all need to weigh in. Dr. Barjatya said that in regard to future work and collaboration with NSF, HESTO might want to be involved as well. Dr. Duncan explained that SWC would discuss who to invite to speak, then put together findings and recommendations. They would have HESTO and NSF talk about what collaboration could look like. Dr. Barjatya asked if HPAC was farming out its work and should be more involved. Dr. Cassak explained that if SWC did not do this, the HPAC members would have to. This way, SWC does the focused work and brings it to the Committee. Dr. Duncan added that HPAC should state if they want additional topics. The tasks are open-ended and there is a lot to do. SWC wants to be more targeted and focused instead of approaching everything broadly. The goal is to provide advice that would help HPD.

Dr. Peticolas noted that there is increased funding for HPD to do space weather research. She wanted clarity on whether this might be where HPD could seek more support. Dr. Duncan said that that was outside of SWC's scope. Ms. Luce pointed out that space weather funding has grown from $5 million annually to $25 million per year, including some other funding lines that had been separate. She cautioned against having such an exuberance for space weather that it takes a bite out of research and the overall heliophysics mission. It does help HPD leverage a lot of its work, however.

Dr. Englert said that he recently reached out to the U.S. Space Force (USSF) on this. He would like to see a single point of contact and would be happy to help to advance the civil/DoD interaction. Dr. Upton asked if SWC reached out to R2O2R PIs. Dr. Duncan confirmed that there was a very robust discussion. Raising the readiness level is one of the desired outcomes, and SWC wants a wider array of models in initial development. They did not speak to R2O2R grant holders but can discuss this further. Dr. Upton said she has heard of growing pains there.

Dr. Cassak asked HPAC if the report should go forward to HPD. All members agreed that it should. Dr. Cassak said that that would happen and thanked SWC for its work.

Distinguishing NASA and NOAA Space Weather Programs

Mr. Jamie Favors of NASA explained that the primary difference between NASA and NOAA space weather is that NOAA is operations-driven, while NASA is science-driven. As such, NOAA informs the nation of forecasts, events, etc. Mr. Favors broke out the NASA role into four components: science, operations, applications, and exploration. On the science end, NASA is currently working to delineate the respective roles of the Living with a Star (LWS) program and the SWxP. On the operations side, NASA is committed to R2O2R to infuse the best applicable science. There are discussions about how and from where to pull in ideas. R2O2R has generated a lot of conversation and NASA is working to improve its role. At the same time, the Agency is looking at how to best implement the applications side. This area is driven by users, and there is probably a larger community than expected. The question then becomes how NASA can be a good partner and what that might look like. There is no funding for that at present. On the exploration side, there have been a lot of good interactions toward enabling lunar and Mars exploration. In the meantime, SWC would like to know what HPAC is hearing from the community and others.

Dr. Kamalabadi asked about mission launch decisions. Mr. Favors said that the launch centers make the final decisions, with real-time analysis from NOAA and forecasts from NOAA's Space Weather Prediction Center (SWPC). Dr. Westlake said that there are many factors involved, and the question as posed does not involve any policy issues. Dr. Upton asked if other SMD divisions are involved with space weather. Mr. Favors said that there is teamwork, an example being with Mars. Dr. Westlake said that cross-divisional work is an option. The Heliophysics Environmental and Radiation Measurement Experiment Suite (HERMES) will go onto an Artemis launch.

Dr. Duncan asked if there are any gaps being addressed. Dr. Westlake said that he is not seeing gaps so much as overlaps. These are not necessarily bad because it enables partnerships across agencies. Dr. Yue pointed out that NOAA has some overlap with NASA science. Dr. Westlake agreed, but noted that the two agencies approach missions very differently, causing the end results to be very different. Therefore, the overlap is warranted. Dr. Englert asked about future technology pull from NOAA. Mr. Favors replied that this already happens to an extent. Dr. Brain asked for some examples of applications. Mr. Favors said that those conversations have just begun. The applied science community is larger than NASA realized. An example might be with insurance companies. Dr. Kamalabadi noted that much of the space weather work began as LWS. Mr. Favors agreed, stating that while space weather is user-driven and LWS is science-driven, it is not always clear where the lines are drawn. He would like to dive in and get more community feedback in this area. Mr. Simon Plunkett, the LWS program scientist, agreed. LWS is trying to coordinate with space weather so that LWS research feeds into R2O2R. To that end, LWS is looking at how to better target what SWxP might need down the road.

Dr. Upton was concerned about squeezing out non-space-weather research. Dr. Westlake said that while space weather is part of the HPD portfolio, there is no requirement that proposals note a relationship to it. He does not want the Division to be "all space weather, all the time." It will always be safe to do fundamental research in HPD, as there are fundamental advances to be made that are not space weather. Dr. Peticolas said that one of the great outcomes from ESD was getting Earth science data into the

classroom. Dr. Westlake said that much of the education effort at NASA is done across the Agency, but encouraging colleagues to participate is important. Dr. Barjatya asked if NASA could help advance new instrument capabilities in space weather. Dr. Duncan said that this area is still being addressed.

Dr. William Murtagh of SWPC posted in the WebEx chat that the biggest gap was captured in a statement from the White House at the signing of the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act. The statement was: "The Act does not address the resilience of national security assets or critical infrastructure to the effects of space weather. Without ensuring the resilience of these assets, our Nation will remain vulnerable to the effects of space weather, regardless of how accurate forecasting becomes."

Discussion of Present and Future SWC Tasks

Dr. Cassak said that HPAC needs to let SWC know of future tasks. While SWC was meeting the next week, this would be for a future meeting. Dr. Duncan added that SWC hoped to provide community feedback to HPD through HPAC, so the focus should be on where HPAC wanted input. There were some topics that are important but could be framed more precisely. For example, SWC would like to know HPD's concerns. Dr. Upton advised SWC to get feedback from the PIs involved in R2O2R, specifically their challenges and how NASA might help. Dr. Duncan said that that was on their radar. Dr. Cassak said that the report indicated that SWC will be distilling gap reports from other entities, which is a great thing to do on a regular cadence. Dr. Duncan agreed, noting that the value might be in pulling in other groups to coordinate. The upcoming meeting would discuss gap analyses, including the modeling gap analysis. She wanted to know if those topics should be ongoing or closed out. Gap-filling discussions have not yet occurred. There are some limits to the Council's scope. Dr. Brain advised closing the gap analyses for now, to revisit on a regular cadence. He noted that lab work can be expensive and wondered if that is an area with needs or gaps. Dr. Duncan agreed on closing the gap analysis topic. Gaps are well-understood, and revisiting regularly could be a good approach, maybe every 3 years. In regard to what is most useful for HPD, SWC cannot make that determination for the Division, though it does seem important to hear from stakeholders on R2O2R. Involvement in the M2M program will require more focus. The next meeting will address modeling gaps and whether the feedback mechanism is working.

Dr. Upton asked about the pending heliophysics DS. Dr. Westlake said that he expects HPAC to provide its opinions. The DS will be a large document with different ways to move forward, so community feedback will be useful. He assumes it will discuss space weather. Dr. Upton said she was also interested in how the DS will compare with the gap analysis. Dr. Duncan reiterated that doing another analysis would be outside the SWC scope. Dr. Peticolas said that SWC has done some amazing gap analysis work. There might be value in showing where the report and the DS do or do not align. It might also help to just be aware of gaps. Dr. Duncan said that this sounded like the gap-filling analysis the Council recommended, so HPAC might advise HPD to do the gap-filling analysis after the DS comes out.

Dr. Duncan said that it seemed like the current discussion was providing plenty of material for the SWC to address. Dr. Kelly Korreck, SWC DFO, asked that HPAC put its advice into the form of findings and recommendations so that the SWC would have a more concrete record of what HPAC wanted the Council to do. Dr. Duncan agreed. She then said that her summary of the HPAC discussion was that SWC should continue reporting the most essential elements of advisory group coordination, including advising the other chairs to report out. The gap analyses discussion would occur at the upcoming meeting and would develop recommendations for HPAC to forward to HPD in regard to the gap-filling analysis and the modeling gap analysis. SWC would then close the gap analysis task, with plans to revisit it in 3 years. SWC will continue reporting out on M2M, but SWC had a request to HPD for help in framing those discussions in the future. This might warrant further discussion at a future HPAC meeting. For domestic and international coordination, SWC will continue R2O2R discussion by pulling in the PIs but would also like further direction and feedback from HPAC. Dr. Cassak asked if space weather modeling not directly

on sun to earth line is in the gap analysis. Dr. Duncan said that there is an example of guidance under the M2M discussion.

HPAC Discussion

Dr. Cassak led the initial discussion of potential findings and recommendations for HPD. HPAC typically begins the feedback by lauding the Division for its accomplishments. Dr. Upton volunteered to coordinate the suggestions for SWC, along with Dr. Duncan. She then asked if they wanted to discuss the flat funding for R&A going forward. Ms. Luce said that program balance is important and budget proportion matters. She would be talking to Dr. Westlake about that. Dr. Westlake cautioned that expressing this concern did not constitute actionable feedback. HPAC should be careful about giving advice, especially in areas where the members might propose. However, if they pointed out areas where there is a perception of imbalance, that would be useful. Dr. Kamalabadi said it would be helpful to have HPD thoughts on balance, with linkages to the overarching objectives. Dr. Westlake said that this was a good idea and HPD can brief HPAC on this at the next meeting. Dr. Peticolas suggested that HPAC try to identify where the new proposers for HSR have come from. Dr. Westlake agreed this could be useful. There has been a broad look at changes in proposal rates within SMD, and HPD can probably pull together something for the next meeting. Dr. Barjatya expressed concern that the percentage of R&A as part of the HPD budget has been dropping. Dr. Westlake said that R&A is protected and cautioned against using selection rates as the driving force for the argument. The main goal is to have great science. Ms. Luce noted that historically, the total of all competed programs in the R&A budget doubled from 2013 to 2018 (while not accounting for inflation). That was significant and reflected the DS, DRIVE centers, and more. In addition, Congress gave the Division an extra $40 million a few years ago. Dr. Koehn pointed out that that additional funding was not extended. He emphasized that the dip is not due to a decision that NASA made, it is due to Congress. Dr. Chadi Salem said it would be good to have data on demographics. He wondered if the people who had grants from the extra funding might be looking for more projects now that those grants are expiring. Dr. Koehn thought that was an interesting point, although the decline in applications is across all of SMD.

Dr. Brain asked about possible changes to the infrastructure mission concept. Dr. Westlake said HPD will roll that out in a future town hall. People should not lose sleep over this. HPD wants to support the community and get input on their pain points and concerns. However, an HPAC recommendation would not be helpful because this is happening soon and the changes will be announced during the summer. The HPD team is doing an amazing amount of work to enable the community. Dr. Cassak asked if HPAC members wanted a finding or recommendation on infrastructure, given that the Committee's information was incomplete. Dr. Barjatya thought HPD should communicate in a way that eases in the community and involves some transitioning. Dr. Westlake reminded them that nothing has changed and the changes that do occur will not be abrupt.

Dr. Englert said he was trying to think of how to help maintain or increase funding. He was not convinced that real-year dollars or percentage of HPD budget were the best metrics, and suggested that they try to look at the number of hours of science or engineering the Division funds annually. That would account for both inflation, administrative burdens, etc. There might be other measures as well. He also suggested that HPD communicate clearly about what the Division cannot do. An example would be to say they wanted to do X but could not because of resources. Finally, he liked the science nuggets and would like HPD to be more proactive about this within the community.

Ms. Luce said that HPD would welcome suggestions for alternative names to "infrastructure." Dr. Zirnstein said that a well-defined presentation of exactly what is planned, with a timeline, would be helpful. The finding might be that this topic is still unclear and a recommendation would be for there to be a detailed presentation at the next meeting. Dr. Brain agreed, and Dr. Englert added that HPD should be

careful to communicate. Dr. Cassak determined that there was support for this finding and recommendation, and asked Drs. Brain, Gkioulidou, and Zirnstein to work on it.

On the R&A budget rate, Dr. Peticolas said they should continue to look into the reasons for the numbers of applications, and Dr. Upton said she liked the recommendation to determine the number of hours supported. Dr. Cassak said that that might change with the next day's presentations, but they could write a preliminary draft that could be edited. Dr. Englert asked for a recommendation that HPD report back to HPAC on what the Division is doing to evaluate the number of applicants and the reasons for the various ebbs and flows. He was concerned that the community might shrink without enough support. Dr. Westlake said that there does not appear to be a singular reason for any of this, just a lot of speculation. None of the attempts to learn more have borne fruit. Dr. Upton wanted more information about the rationale for the balance. Dr. Yue noted that the geospace community has traced a similar issue to a smaller number of PhDs. Dr. Brain said HPAC should have a finding in support of the science nuggets, with a recommendation that they remain as simple and easy to submit as possible. Dr. Upton agreed and said HPAC should add that these present HPD's great science to both the science community and the broader community. Ms. Luce noted that it is not helpful to simply have a nugget that says "we did this." Submitters should explain why it is important and what they learned. HPAC agreed to have a finding and recommendation on this.

There was also concern about HISFM, since HPAC members were hearing different things from the community and HPD. Ms. Luce said that a recommendation to present on this at the next meeting would clear the confusion. It was agreed to do that. Dr. Duncan then said that it would be good to have a finding that the TTX is a good exercise, and maybe a recommendation to do more of those. There was support for this as well.

Dr. Zirnstein said they might look at ways for HPD to provide better advice on community issues. He did not believe that town halls were that useful since a lot of people do not attend. An alternative might be a dedicated website or page to provide input on issues, which would allow HPD or HPAC to determine what issues warrant further investigation. Dr. Westlake was less sure about that. HPD already receives feedback in addition to the town halls. Finding more ways to collect and gauge community input is important, but he was wary of prescribing a specific method. Dr. Peticolas agreed, but she supported the intention of finding other ways for feedback. Dr. Westlake asked if HPAC members attend town halls. It turned out that some did and others did not. Dr. Westlake said that an issue is that the anonymized question system does not allow for follow-up. HPAC supported the rewording suggested by Dr. Peticolas.

HPAC Work Session for Writing Preparatory Material
HPAC went into closed session in order to write.

Adjourn
The public portion of the meeting was adjourned for the day at 4:10 p.m.

Tuesday, February 13, 2024

Welcome to Day 2
Dr. Kozyra opened Day 2 of the meeting and turned it over to Dr. Cassak.

Overview of Agenda

Dr. Cassak welcomed the participants and reviewed the agenda.

Europa Clipper and JUICE Missions Cruise Phase Coordination

Drs. Louise Prockter of APL and Emma Bunce of the University of Leicester spoke about the potential for joint science during the cruise phase of NASA's Europa Clipper mission and the European Space Agency's (ESA's) Jupiter Icy Moons Explorer (JUICE). There is no funding at this point, but a team has come together to study the possibilities. A report would be available within a few weeks.

Dr. Bunce explained that the presentation was on concepts and opportunities for the two spacecraft to work together. JUICE launched in 2023 and will take 8 years to reach Europa, while Europa Clipper has a planned launch date of October 2024 and should get to Europa within 5.5 years. Both are ultimately headed to Jupiter, but the different trajectories account for the variance in timing. The "cruise phase" is that portion of the journey in which the missions are in transit. This leads into the "approach phase" as they enter Europa's orbit and close in on Jupiter. JUICE will measure the upstream solar wind and interplanetary magnetic field conditions while Europa Clipper is in the magnetosphere. The timing difference puts one mission ahead of the other so that there is a leader and a follower. They will join up in 2031. JUICE might operate beyond 1.3 AU and Europa Clipper beyond 1 AU.

The study team developed simplified matrices for the science objectives, one matrix for the cruise phase and another for the approach phase. Within these, the team identified objectives along with top-level measurement requirements and payload operation proposals. Each of these is ranked according to three priority levels and three scores for ease of implementation. While some of this is speculative, the study team has identified payload capabilities.

The interplanetary cruise phase provides a rare opportunity for multi-point measurements of the heliosphere between 1 and 5 AU. Such an opportunity was last seen years ago with Voyager. Potential objectives include study of the evolution of solar wind shocks, solar wind transients and turbulence, and more. Additional studies could address interplanetary dust, galactic cosmic rays, and interplanetary hydrogen. Dr. Bunce noted where the trajectories sit in relation to Solar Cycle 25, adding that the cruise phase will occur during the solar maximum and its fading. She then presented a list of cruise-phase science objectives and the candidate instruments. She emphasized that none of this has been studied or agreed upon. She next gave examples of the cruise phase objectives, for which the study team has developed a template outlining each objective, noting potential payload instruments to be used and the observation requirements. She also illustrated how the scoring is done.

For the Jupiter approach phase, the monitoring opportunity would help address longstanding questions about the magnetosphere and enhance understanding of the role of solar wind disturbances. Dr. Bunce listed the approach science objectives and candidate instruments, then gave examples using the template that is employed for scoring. This work cannot be done with a single spacecraft, which is why the possibility of JUICE and Europa Clipper working together constitutes a unique opportunity.

Dr. Bunce then discussed candidate spacecraft configurations that would help answer the objectives. It is probably not feasible to conduct the measurements continually during the cruise and approach phases. Therefore, the study team has identified several optimal configurations that might be possible. If additional study were to go forward and receive funding, these would warrant a more detailed investigation. She also described the preliminary options the study team has identified:

- Heliospheric Longitude Alignment;
- Heliocentric Radial Distance; and
- Parker Spiral Connection, which is speculative and dependent on solar wind velocity.

The final part of the approach provides another opportunity for the spacecraft to connect.

The study team believes there could be opportunities for coordination with additional missions such as PSP and IMAP, among others. The team is advocating for a broad partnership and coordination of measurements among NASA, ESA, and the Japanese Space Agency (JAXA) in order to fully exploit what is likely to be significant public interest. The cruise phase measurements have potential to predict solar wind conditions once the two spacecraft enter the Jovian magnetosphere. Dr. Bunce referred to some of the work done by the Cassini astrophysics spacecraft.

In summary, this is a unique opportunity for two spacecraft to coordinate measurements as they travel from the inner to outer heliosphere, something we have not been able to do since Voyager. The approach phase also presents an unmatched scenario, one that could address high-priority science questions about Jupiter's magnetosphere.

Dr. Cassak thanked Dr. Bunce for her presentation. He asked that any HPAC member facing a conflict of interest (COI) to recuse themselves from the meeting until the next presentation. Dr. Gkioulidou had a conflict with JUICE and stepped out of the room for the duration of the discussion. Dr. Westlake explained that he was "super-conflicted" because he had been an instrument PI. He delegated any decisions to Ms. Luce. Dr. Marco Velli checked about a possible institutional COI, but it was determined that he was not conflicted and therefore had no need to recuse himself.

Dr. Barjatya said Dr. Bunce made an excellent case for the science. He wondered about involving the Escape and Plasma Acceleration and Dynamics Explorer (ESCAPADE) and any SMD missions en route to Mars. Dr. Brain found the presentation exciting and compelling. Anything beyond 1.5 AU would be useful for solar wind monitoring, but he wondered when it would be most useful to have a solar wind monitor. Dr. Bunce said that the later part of the cruise and leading into approach would be the priority, but anywhere between Mars and Jupiter would be helpful. Dr. Brain observed that the orbital animation she showed made it appear that one spacecraft will leave Mars at the same time the other is approaching, which also seems compelling. Dr. Bunce agreed, noting that the study team would like more time to look at these details. Dr. Prockter added that they have spoken to the Mars Atmosphere and Volatile Evolution (MAVEN) mission team.

Dr. Duncan asked if they had determined what to seek in going forward. Dr. Prockter replied that while it is early, they would be using existing assets that are in the right place at the right time, so the expectation is that the need for resources would not be huge. Dr. Bunce added that they still need to assess the JUICE operations, but the team is optimistic. The Europa Clipper side has already looked at the magnetometer and other instruments for technical feasibility. Dr. Prockter explained that the team is looking at the intersections of priority and ease. The full study team will continue work through the Europa Clipper launch. Beyond that, they will have a low-level team, though some of this will be up to the projects. Dr. Cassak thanked Drs. Bunce and Prockter, and Dr. Gkioulidou returned to the room.

Requirements for Different R&A Programs

Dr. Koehn said that HPAC had asked for clarity in regard to the expectations for proposals submitted to different heliophysics ROSES opportunities, specifically the amount of data analysis versus theory/simulation proposers are allowed or expected to do for each of the opportunities, and how they differ. ROSES B2 HSR 2024, which was to be released the next day, requires that proposals meet at least one of the three heliophysics objectives. For Step 2, proposers must use data available in a publicly accessible archive. Proposers are also encouraged to use elements of data analysis, modeling, theory, and/or simulations. While the requirement is for only one such element, successful proposals usually have more than one. Dr. Koehn added that HSR and the Heliophysics Guest Investigator – Open (HGIO) program tend to be more prescriptive than other R&A elements. He hears concerns about what will

happen if PIs propose to the "wrong" program. Dr. Koehn reassured HPAC that the HPD program officers will advise shifting proposals as appropriate. Also, the Step 1 proposal is an abstract.

For ROSES B4 HGIO, the primary dataset must come from HSO missions that are currently operating, though there are also requirements regarding cubesats, mission end dates, etc. Similar to HSR, proposers must use data available in a publicly accessible archive. Proposers must show that data analytics will comprise at least two-thirds of the effort; other techniques must be justified. Review panels are instructed on how to evaluate this. The intent is to provide the community with opportunities to do research using data from any currently operating missions.

Dr. Englert was concerned about the two-thirds/one-third metrics, as the proposal team might perceive it one way but the review panel might perceive it differently and give them a lower score. Dr. Koehn said that the onus is on the proposer to be clear. While there is indeed potential for a grey area here, proposers can include a paragraph on how they determined the breakdown. Dr. Cassak asked for clarification regarding the statement that successful HSR proposals often address more than one element. Dr. Koehn said that this results from panel reviews but the fact that multiple elements is not required is discussed in the plenary session before the panel starts. Dr. Yue asked about DAPR. Dr. Koehn said that HGIO was the pilot for HPD, and DAPR is now used by the three largest R&A programs. The plan is to have it be the norm in 2025.

Dr. Gkioulidou asked to confirm that in regard to HSR, proposals are not required to have both data analysis and modeling, but statistically, the successful ones do. Dr. Koehn replied that there have been rough numbers associated with the breakdown. Program officers do have some discretion here. Dr. Gkioulidou said that there is clearly a gap for pure data analysis studies that do not use currently operating missions. She assumed this meant that anyone wanting to do this type of study could only apply to HSR. Dr. Koehn said that proposers can apply to LWS as well if the topic is open. Dr. Gkioulidou said she would like to see R&A encourage panels not to be too strict about the modeling component. Dr. Koehn said that if they wanted to include only historical data, including a very small modeling effort would round out the study. He will take this back to the group and see what he can do.

Dr. Kamalabadi asked about the delineation between HSR and other topics that might be related. Dr. Koehn replied that a proposal submitted to HSR that would also go under LWS or space weather is allowed and would not receive demerits. The programs with restrictions are data analysis and modeling. As for proposing focused science, there is the issue of release of HSR focused science topics. Space weather is more modeling- and operations-oriented, and HPD would treat such proposals on a case-by-case basis. Each program has its own objectives. Dr. Duncan asked how HPD coordinates among R&A programs. Dr. Koehn said that this is done as much as possible. It is not serendipitous, but there is no formal setting for these discussions. Dr. Friedel said that there is a new effort among domain leads to formulate how this should work.

<u>R&A Portfolio - What Information Would HPAC Like to Request about the R&A Portfolio and Why?</u>
Dr. Cassak said that he has been on HPAC for 6.5 years, and this R&A portfolio question comes up perpetually but never gets resolved. First, HPAC has not been specific, and HPD has differed on what can or should be shared. The Committee has been getting more information lately, but the sense of the November meeting was that they should raise the issue again. He wanted HPAC to decide what they can advise on regarding R&A that HPD can work with. He listed some ideas:

1. Balance of portfolio, different elements, and their funding.
2. R&A budget.
3. Whether high-quality proposals are funded, outside of the proposal rate.
4. Whether proposers are funded appropriately to their demographic background. SMD has worked on this.

5. Balance and sufficiency of budget for out-years, which are not reliable but do set expectations.

HPAC is advisory, and HPD can decide whether or not to take the advice.

Dr. Upton said that balance was a high priority. Dr. Kamalabadi agreed. Balance implies all of HPD's allocation of resources and should trace back to the overarching objectives. He wanted to know if there were opportunities missing that they would want to consider, like a new program or focus. Dr. Upton said that while some of these things are tightly restricted, the constraint information would provide good perspective. Dr. Westlake said that the budget process can be complicated but it can also be learned. It is easier to set the general direction than to get into specific funding levels. HPD would like guideposts, which would also keep HPAC members out of COI territory. It was clarified that the discussion encompassed both the overall HPD program and R&A balance.

Dr. Englert said it would be valuable to hear what the balance is and how it is driven by the DS. They might also have HPD explain what high priorities cannot be funded, what the Division would do with more funding, and how the decisions are made. Dr. Westlake appreciated that comment. It can be a challenge if there is conflicting advice between HPAC and the DS. In addition, HPD must be careful because certain selections have embargoed information. However, some areas, like recent Explorers, have highly ranked missions that are sometimes unfunded. Dr. Englert clarified that he did not want to give guidance that conflicts with the DS, but HPAC would like to understand the basis of decisions. Dr. Duncan found the topic of omitted missions to be interesting. The concept of broader impact versus smaller niche communities is a balance area. For example, space weather has a lot of things tied to it because it is seen as likely to be funded, but niche areas that do not always translate to space weather still need to be supported. Dr. Jorgensen said that this is where HPAC can add value as a check, by stating such principles.

Dr. Brain liked the five categories Dr. Cassak proposed. He would rank them and not be prescriptive. They might select two or three to be addressed soon with the rest being less urgent. His priorities would be the overall R&A budget, balance, and demographic distribution of proposers and awards. He wants to know who is funded now. Dr. Barjatya said that with the transitioning of work to the infrastructure category, perhaps R&A should go up and not remain flat. Dr. Upton wanted a sense of the number of researchers being funded through R&A, and Dr. Duncan said that that should include students. Dr. Englert said that some of those metrics might not be simple, especially since not all areas have comparable strength in the proposals. Dr. Salem added that they should consider that some domains are said to have more critical reviewers than others. Dr. Koehn replied that the program directors usually have a handle on that.

Dr. Cassak observed that the SMD yearbook put out by Deputy Associate Administrator for Research Dr. Michael New shows that HPD does well in funding women. In the WebEx chat, Dr. Arik Posner said "The male/female success rate has been even before the introduction of DAPR, across all of SMD's divisions. The exception is outsourced programs, such as the Space Science Telescope Institute's allocation of Hubble time."

Dr. Jorgensen asked if they knew what a healthy program looks like. That could be a long study. Dr. Kamalabadi pointed out that they need to understand the objectives and see how NASA implements DS priorities, and in what form. Dr. Cassak asked if they should not get into metrics. Dr. Upton observed that they are interested in the quality of parameters and how the program reflects them.

<u>IDEA – Update on Inclusion Plans and Evaluation Procedures in HPD ROSES</u>
Dr. Susanna Finn of NASA discussed the SMD Inclusion Plan (IP) pilot program, which began in 2021. HPD participated in the pilot in ROSES 2023 with the Heliophysics Citizen Science Investigations

(HCSI) program, for which panels and selections are ongoing. The IP program remains a pilot at this time. Dr. Finn read the program goals. Over course of the pilot, each IP review has led to lessons learned, which have been applied so that the program continues to evolve. While the language for the IP requirements was originally left up to the participating programs, in 2022 Dr. New and his team established an IP Community of Practice (CoP) to centralize IP goals and processes. Dr. Genene Fisher is the HPD representative to the CoP. The CoP developed standardized IP language for ROSES 2023, in which inclusion is defined as full participation, belonging, and contribution by individuals and groups within an organization or engaged in an endeavor. Dr. Finn described the requirements for IPs, which are up to 2 pages in length. While it is not sufficient for proposers to copy the IP language from their institutions, they are encouraged to leverage institutional resources. There are a number of other preferred practices, which Dr. Finn listed.

Evaluation of IPs is another area receiving attention. While IPs are not optional for the participating programs at this time, they are also not included in the adjectival ratings and do not inform proposal selection. Dr. Finn reviewed the evaluation criteria that were listed in the ROSES Announcement of Opportunity (AO). Additional expectations of IP panel reviewers for ROSES 2023 include: evaluation of plans to provide feedback to proposers and NASA; evaluations and recommendations of the solicitation language and the review process; and, feedback on the resources pages and/or other additions that would lead to improvements. IPs will be assessed for adequacy, appropriateness, and completeness. Feedback will be provided to proposers, and investigations will be required to describe their progress in implementing the IP in the annual progress report. Evaluation processes have been standardized as of ROSES 2024; HCSI will also participate in the IP pilot program in 2024.

There has been much discussion within the community and SMD about the need for IP resources, possibly including templates. To that end, SMD now has a web page for proposers that is updated and expanded continually. Dr. Finn showed the table of contents, noting that the page provides a lot of information in many different categories. SMD continues to solicit input for this. Another community outreach effort was planned for the following week, with a town hall webinar that would discuss the goals of IPs, their requirements, and the evaluation efforts.

Dr. Zirnstein liked this. He said he understood why it is not required for all programs, but he wanted to know about plans to roll it out more broadly. Dr. Koehn replied that it is too early to have such plans. Dr. Zirnstein then asked what they hoped to get out of the pilot if it is not part of the ratings. Dr. Finn explained that developing these IPs is good practice and it makes proposers think. It is also an opportunity for two-way feedback. One goal is to determine if it can be a selection criterion eventually. Dr. Koehn added that this is standard procedure when SMD is moving toward creating a new requirement. It is a way of training the community and has been done before, as with the data management plans. Dr. Upton thought it was an excellent way to transition. Dr. Barjatya said that one of the concerns is that smaller institutions with fewer resources might be disenfranchised since they do not have program offices that can help with this. Many such institutions lack resources to hire consultants, for example. There should be guidance and financial support. Using these plans during selection would be premature at this time. In addition, many institutions are in states with active policies against IDEA, so this is hard for them.

Dr. Finn said that HPAC was raising a lot of great points, many of which had been raised before but she would pass along again. Dr. Cassak wondered what happens if a state forbids DEI and a Federal grant requires it. Dr. Gkioulidou mentioned that if it has to be included in the budget without a corresponding increase in the cost cap, it comes from science. There is also the danger of tokenism where the same person is used to check the boxes. Dr. Finn said that tokenizing is different from diversity/inclusion and would not be evaluated favorably. As for the budget, for now there is no increase. Dr. Cassak asked if SMD had discussed having a separate pot of funding for this. Dr. Koehn said that there is precedent but no such pot at this time.

Dr. Duncan asked how the community is to learn best practices. Dr. Finn said that the resources page has some on this, and it is provided to reviewers. It is also likely to be covered in the town hall the following week. Dr. Cassak said that the Department of Energy (DOE) has changed its practices in this area and is ahead of NASA. Dr. Peticolas asked if there is a reason for HPD to start with citizen science, and if the IPs were to include work with the volunteers. Dr. Finn said that HCSI is a newer program, as of 2022. It seemed a natural fit because in 2022 a lot of the proposals included IDEA discussion already, even though it was not required or an evaluation criterion. As for the volunteers involved in citizen science, they do not need to be addressed at this point, though that could change. Dr. Yue said that his experience is that some R&A programs have more inclusion than others, but some of the smaller ones might have only a single PI and a student. Dr. Finn replied that there is language indicating that an IP for a small team will differ from that of a large team. The CoP is trying to balance the concerns while moving forward. Dr. Cassak said that the last HPAC meeting raised the issue of assessment, which can be hard. Dr. Finn said that this is still being looked at, but the resources web page addresses metrics. In the WebEx chat, she provided the link for the SMD Inclusion Plan Town Hall for Feb. 20: https://science.nasa.gov/researchers/virtual-townhall/

Public Comment

The meeting was opened to the public for comment.

Dr. Nick Arge said that there is a lot of worry in the community about funding cuts and the impact on R&A, especially in HSR and HGIO. He wondered if HPD could provide the annual dollar amounts corrected for inflation. Dr. Westlake replied that HPD support for R&A is strong. The data Dr. Arge asked for was not immediately at hand, however. Dr. Arge said that the concern is that HSR and HGIO may be impacted more than people realize. Dr. Cassak added that HPAC is often told certain funding information is not available, but other divisions provide it to their advisory committees. Dr. Westlake said that he was still new but had a similar understanding. He promised to poke around and see what might be possible. He wants transparency and wants the community to be confident, so he will try to figure this out for the next meeting. This was a good piece of feedback.

Dr. Pontus Brandt of APL introduced himself as the new project scientist for New Horizons (NH). NH has unique measurements of pickup ions, and because of this, the project has an influx of new young scientists. The team was invited to the HPD SR but chose not to respond because NH was to be considered as infrastructure. The Planetary Science Division (PSD) offered to extend NH to 2029, but FY25 and FY26 funding from HPD will be low, which will reduce or halt many of the mission's efforts. He encouraged HPAC to discuss the science and heliophysics value of NH. In addition, the JUICE presentation was good and HPD should determine how to do this. However, PSD is supporting three sensors and instruments already and needs support. Finally, the public comment period should be longer than 5 minutes. Dr. Cassak replied that in regard to the public comment period, it is easy to extend a short time on the agenda but it is not possible to cut a longer time, so the agenda errs on the side of brevity.

Dr. Ian Cohen of APL was the final speaker. He said that the unclear future of the Geospace Dynamics Constellation (GDC) should be consistently addressed at each HPAC meeting. He was concerned that it was not on this agenda.

HPAC Discussion (Potential Issues for Findings and Recommendations)

Dr. Cassak led the Committee in discussing findings and recommendations. Dr. Gkioulidou stepped out of the room while they discussed whether to have any findings or recommendations about the Europa Clipper and JUICE presentation.

Dr. Peticolas said a first finding could briefly describe Europa Clipper and JUICE, and a second finding could be that they will be traveling through the solar wind, taking measurements of plasma and other phenomena. They will then be within Jupiter's magnetic fields. A recommendation might be that HPD should continue discussions about potential coordination between these two missions. Dr. Upton said that this is a good opportunity to leverage resources and they should recommend that NASA pursue it. Dr. Salem suggested they note that it will add value to heliophysics and other disciplines related to physics. Dr. Duncan agreed and advised recommending that HPD work with PSD in looking at the technical feasibility and creating detailed resource requests. Dr. Westlake pointed out that these requests have not been through a competitive process, so HPAC might want to weigh in on what is fair in that regard. Dr. Brain agreed that the science is compelling and broad, but there is still a lot to do regarding feasibility and resources. He thought they should acknowledge that. It was agreed to write this up.

After Dr. Gkioulidou rejoined the meeting, Dr. Cassak said that in regard to the R&A portfolio, it seemed the main issue was the funding gap for historical data. Others agreed. Dr. Salem suggested a recommendation regarding data for missions that have stopped operations and where proposals using those data should go. Dr. Westlake advised letting HPD handle the issue of datasets without a home in ROSES. Dr. Kamalabadi asked why historical data are left out. Dr. Cassak noted that it was okay for HPAC to suggest things HPD might not want to do, because it represents the opinion of the committee even if the Division does not do it. Dr. Brain said a recommendation could be that HPD either find a home for these datasets or present the rationale for why it does not. HPAC decided to develop that version.

Dr. Peticolas wanted to state that not everything fits into or should go into space weather. Others agreed. Dr. Duncan suggested having it as a gentle reminder that there are other topics. She hoped the upcoming DS will have more guidance. Dr. Kamalabadi asked what was actionable here. Dr. Upton said that an actionable item would be to have calls state that space weather is not the only broad impact being considered. There was a debate as to whether such an overreliance actually exists. Dr. Jorgensen noted that a connection to broader impacts is not a requirement. Rather, impact on NASA science goals is what needs to be addressed. Also, NASA science underpins the nation's space weather efforts, but space weather does not underpin all of the science. Dr. Duncan noted that regardless, she encounters this misunderstanding throughout the community. She was concerned that the community has niche groups that worry about where they can propose. Her finding would be that the community is concerned with space weather taking up too much of the portfolio, with a reassurance that not all science goes there. This would address community perception and constitute an area for HPD to clarify in its communications. Others agreed.

Dr. Cassak said that any finding on the R&A discussion should address themes, not metrics. Dr. Upton liked Dr. Brain's suggestion to select two or three items from Dr. Cassak's list as a higher priority for additional information that would be qualitative rather than metrics. Dr. Zirnstein suggested a separate finding based on what Dr. Kamalabadi said about the need to understand how HPD implements DS advice, specifically in regard to R&A. They discussed the ranking of Dr. Cassak's list. There was debate as to how to accomplish this and how many findings would result. Dr. Englert reiterated the notion of determining how many of the top ranked proposals could be funded. Others agreed. Dr. Zirnstein referred to the need to address the DS recommendations through the R&A budget. Dr. Peticolas agreed, adding that there is a lot of interest in proposal pressure, how the budget is set, and a sense of the number of researchers and students supported each year. This would be separate from any discussion of demographics. Another question is whether scientists are being lost due to insufficient funding. Dr. Englert said that NASA needs to provide a metric that allows HPAC to better assess trends over the long term, not just real-year dollars. Dr. Cassak said that the idea was to note where HPAC interests lie. They agreed to move forward.

Another possible finding concerned information provided to the community and the level of detail HPAC receives about funding. Other divisions are more forthcoming and HPAC wanted to recommend that HPD look into doing more. If the information cannot be provided, HPAC would like to know why. Dr. Westlake said that HPD was still working on findings and recommendations from the previous meeting. He wanted HPAC to let him know if there were any earlier Committee comments that should be addressed. Ranking HPAC findings and recommendations was suggested, but Dr. Cassak did not think there was sufficient time in the meeting for this exercise.

Dr. Peticolas said that one finding from the previous meeting she wanted to repeat had to do with the status of the GDC. The upcoming DS might determine that there are higher priorities, but regardless, the community needs to hear about why it has been delayed. GDC was included in the current DS only after a contentious discussion. Dr. Westlake said that the PBR directed NASA to pause GDC. This was not an HPD intention. GDC is the next LWS mission – a flagship – and HPD supports it. It is important science but the budget constrains HPD. Dr. Upton said that this is exactly what the community needs to hear, with reassurance that it is not being forgotten. Dr. Brain asked if HPD might describe the relative priority or make stronger statements about its importance. Ms. Luce explained that HPD is very much following the DS priorities, which were R&D, DRIVE, IMAP, etc., and was at the point of doing GDC when Congress stalled Division funding. HPD did not blow it off. Every DS has things no one can afford. NASA wants the DSes to dream big and cause them to need more money. Dr. Englert suggested holding this topic until the new DS is out, but Dr. Westlake said HPD could provide context. Dr. Brain said that the fact that this was next on the list is a great statement. Others asked HPD to state this directly. Dr. Upton said that the problem is that this has not been sufficiently communicated. Dr. Englert said that this should be a constant message. There was support for this as a recommendation, which Drs. Peticolas and Yue would work on together.

Dr. Upton wanted to know if there should be a finding or recommendation stemming from the IDEA presentation. Dr. Duncan proposed a finding that would emphasize training and the potential disparities that proposers might face regarding access to tools and resources. The online information is good, but she wanted to see NASA do more, such as workshops. She put forth a potential recommendation that HPD provide training beyond the webpage to address IP best practices. This would be in order to mitigate concerns about uneven levels of institutional resources among proposers. Dr. Upton agreed. Dr. Cassak reminded HPAC that he had suggested that there be extra funding for this at the SMD level rather than anything that could be construed as "science money." Dr. Duncan agreed. Dr. Brain added that there should be a finding acknowledging that the presentation answered many questions that HPAC had raised at the previous meeting.

Dr. Cassak wanted HPAC to ask HPD to clarify whether Federal law supersedes state law on IDEA. Dr. Barjatya said that he would like to get this information from HPD because many of the institutions facing this kind of discrepancy would benefit. Dr. Brain pointed out that that is a legal question and should be separate from the findings and recommendations about IDEA. Others agreed.

<u>HPAC Work Session Preparatory Material</u>
HPAC members took time in closed session to work on the findings and recommendations.

<u>Recommendations and Findings Open Discussion</u>
When HPAC reconvened in public session, Dr. Cassak displayed the draft findings and recommendations, which were required to be finalized for content during the meeting but could be wordsmithed afterwards. The first slide summarized the *meeting topics*. Next was a commendation for *HPD successes*, including the appointment of Dr. Westlake; the AWE first light; and being part of the space weather Quad Agency MOU. Dr. Peticolas read *R&A findings*, which included a commendation for making R&A a priority, recognition of the increase in applications and their impact, and a note stating the decline in such

proposals at NSF. HPAC recommended that HPD strive to understand the reasons behind the variations in proposal submissions, and present the results of this effort to HPAC.

Dr. Zirnstein read findings on *community feedback*, to the effect that HPAC was unsure whether town halls constitute the best means of communication. In the recommendations, HPAC advised HPD to continue with the town halls but also examine additional means to bring in community voices. Next were findings and recommendations on the *space weather TTX*. This represents the type of NASA-NOAA collaboration that HPAC hopes will continue. HPAC recommended seeking additional opportunities to support space weather through scenario-planning activities and advised that HPD find ways to use the TTX output in addressing modeling and observation gaps. Dr. Upton read the findings and recommendations on *science nuggets*, to the effect that this is a great way to engage the public and support the science. HPAC recommends continuing with this, while ensuring that the submission process remains simple.

Dr. Duncan read the finding that *SWC has effectively addressed the tasks* that HPAC assigned to it. Associated recommendations were for HPD and the SWxP to present the next HPAC meeting with new topics for SWC to address, and for NASA to include the SWC recommendation for an observational gap-filling analysis in its response to the upcoming DS. HPAC also listed five tasks for SWC:

1. Continue coordination with other space weather advisory committees;
2. Report back on the TTX results;
3. Hold off on M2M pending further guidance from HPD;
4. Continue interagency coordination; and
5. Gather feedback from PIs on ways to make R2O2R more accessible.

Drs. Duncan and Kozyra confirmed that SWC is indeed allowed to seek community information from PIs and others.

In regard to *HSO infrastructure* missions, HPAC found that there is confusion in the community regarding what this entails and how it will impact scientists. Therefore, HPAC recommended a number of proactive communications on this and related topics, including the changes under consideration, what will and will not be allowed by proposals as a result of these changes, specific impacts on EC scientists, and what kind of transition is being planned.

For the *HISFM* findings and recommendations, Dr. Yue left the room due to a possible COI. After some discussion and editing of the draft, HPAC agreed that the findings should note community concern about how Step 1 proposals are selected to move forward, possibly conflicting with IDEA efforts, as well as the fact that what HPD was saying and what HPAC members were hearing in the community appeared to differ. Recommendations were for HPD to ensure consistency with IDEA, and to brief HPAC at the next meeting. During discussion, it was noted that there is no funding in Step 1.

After Dr. Yue rejoined the meeting and Dr. Gkioulidou stepped out, the draft findings and recommendations on the *potential Europa Clipper and JUICE mission collaboration* were presented. After some discussion, the findings constituted a recap of the presentation along with a statement that HPAC believes this to be an excellent opportunity. The recommendations were for HPD to continue discussions about coordination between the two missions and possibly others, while also working with PSD to encourage the Europa Clipper and JUICE teams to assess feasibility.

Once Dr. Gkioulidou returned to the room, HPAC discussed findings and recommendations having to do with *community perception about space weather and the HPD portfolio balance*. The findings noted the community perceptions and concerns that space weather might be preferred to other areas of science, possibly to the detriment of smaller, niche specialties that have little to no relationship to space weather.

The recommendations were for HPD to provide clearer messaging to the community about the misconceptions surrounding the supposed need for "broader impact" statements in proposals, and for HPD to be explicit in its instructions to evaluators and others in order to reinforce this concept.

The next finding was that while *IPs have great potential to promote DEI objectives*, there is a *disparity in the resources* available among institutions that could negatively affect proposers from organizations lacking such resources. The recommendation was to offer additional training on how to develop IPs. A related set of findings addressed *community concern about IDEA resources* and possible cost issues should such resources come at the expense of the actual science effort. HPAC recommended that HPD explore whether additional, dedicated resources might be made available for IDEA activities, possibly from SMD. There was also a finding about *potential conflict between state and Federal requirements related to IDEA*. HPAC recommended that HPD consult NASA legal counsel on this so that guidance can be provided to PIs.

HPAC had concerns about *GDC* for several reasons. The findings addressed that this is an important mission recommended by the DS, but it has been put on hold due to budgetary constraint. Since the community is uneasy about the possibility of it not going forward, HPAC recommended that HPD communicate clearly about the future of the mission.

HPAC had a finding and multiple recommendations about the HPD *R&A portfolio*. The Committee stated that HPAC does not receive the detail it needs to provide appropriate advice to HPD regarding R&A. The first recommendation listed five areas in which HPAC seeks a briefing at a future meeting. In order of priority, these include:

1. The overall R&A budget and trend beyond real-year dollars, possibly by full-time equivalents (FTEs) supported;
2. Balance within the portfolio;
3. Demographics of proposers and awardees;
4. Proposal pressure as measured by high-quality proposals alone; and,
5. Plans for the R&A budget in upcoming years.

Dr. Cassak noted that the recommended briefing should be provided annually. While acknowledging that the fourth item in the list might be the easiest to provide, HPAC emphasized that the first three items were most important to the Committee. HPAC further defined "demographics" as including EC participants, in order to help gauge the health of the community. HPAC also defined "high-quality proposals" as having adjectival ratings of Very Good or better. There was some discussion about whether to ask HPD for the same level of information that other SMD divisions provide, but since Dr. Westlake had already agreed to look into this and report back, that potential recommendation was removed.

A finding on *research opportunities using legacy datasets* noted gaps and restrictions. HPAC recommended that HPD investigate broadening opportunities for using these data. If that is not possible, HPAC seeks an HPD briefing on the rationale. The final finding noted that HPAC could benefit from more clarity on *how HPD balances the broader portfolio*. The accompanying recommendation sought clarification in three areas:

1. How the overall budget distribution is determined;
2. A finer level of granularity to the items in the budget, tracing these back to the Division objectives; and,
3. How HPD digests the DS and ensures alignment between it and the Division objectives.

<u>Report out to the HPD Director</u>

Before presenting the HPAC report to Dr. Westlake, Dr. Cassak noted that the entire Committee was present, either in-person or virtually. He began with a new finding, on *the budget*, stating that the flat

budget has resulted in a de facto reduction in funding for science, and this is of great concern to the community. From there, various HPAC members read the draft findings and recommendations discussed above. When Dr. Barjatya read the finding about IDEA implementation, Dr. Westlake asked that HPAC come back to him with some specific examples of the problem. Otherwise, the content was agreed upon and Dr. Cassak stated that HPAC would get these to Dr. Westlake after some additional wordsmithing.

Dr. Westlake said that he appreciated everyone's time and feedback. HPD takes this seriously and will respond to the best of its ability, given that there is a limited staff. Dr. Cassak noted that HPAC did not have time to rank the findings and recommendations but hopes to do that in the future. Dr. Westlake replied that many of these will help set the agenda for the next meeting. He imagined they will be able to describe the budget process more clearly, plus R&A and IDEA possibilities. In regard to the upcoming DS, it will take time to read and digest this lengthy document, so even if it is out before HPAC meets again, HPD is unlikely to have a lot to say about it. Dr. Upton noted that HPAC will have to assess it as well. Dr. Jared Leisner pointed out that SMD policy is to respond within 90 days. There will be town halls to communicate with the community. Dr. Westlake noted that HPAC input will be helpful once they see the DS implementation.

Dr. Cassak said that some potential dates would be sent to HPAC in order to schedule the next meeting. He would also send out the minutes from the previous meeting for approval. He thanked the members, HPD, Dr. Kozyra, and other participants. Dr. Kozyra thanked everyone who joined the meeting.

Adjourn

The meeting was adjourned at 5:04 p.m.

Appendix A
Participants

Heliophysics Advisory Committee Members
Paul Cassak, West Virginia University, *Chair*
Janet Kozyra, NASA Headquarters, *Executive Secretary*
Aroh Barjatya, Embry-Riddle Aeronautical University
David Brain, University of Colorado, Boulder
Nicole Duncan, Ball Aerospace (remote), *Space Weather Council Chair*
Christoph Englert, Naval Research Laboratory, *Vice Chair*
Matina Gkioulidou, Applied Physics Lab, Johns Hopkins University
Farzad Kamalabadi, University of Illinois, Urbana-Champaign
Laura Peticolas, Sonoma State University
Chadi Salem, University of California, Berkeley
Lisa Upton, Southwest Research Institute
Marco Velli, University of California, Los Angeles (remote)
Jia Yue, Catholic University of America
Eric Zirnstein, Princeton University (remote)

NASA Participants
Sumera Ali
Nick Arge
Maria Busuioceanu
Chris Caisse
David Cheney
Georgia de Nolfo
Gina DiBraccio
Elizabeth Esther
Jamie Favors
Susanna Finn
Galen Fowler
Nicola Fox
Reiner Friedel
Heather Futrell
Edward Gonzales
Lika Guhathakurta
Roshanak Hakimzadeh
Alexa Halford
Aleida Higginson
Denise Hill
Andrea Hughes
Skyler Kleinschmidt
Jim Klimchuk
Patrick Koehn
Kelly Korreck
Jared Leisner
Guiping Liu
Margaret Luce
Amy Marshall
John McCormack
Therese Moretto Jorgensen
Curt Niebur
Carol Peterson
Kate Peterson
Simon Plunkett
Arik Posner
Antti Pulkkinen
Doug Rabin
Carolina Ravinskas
Nicole Rayl
Ursula Rick
Kayla Rillo
Tara Roberts
Alvin Robles
Andrew Rowe
Walter Twetten
Ekaterina Verner
Daniel Walsh
Joseph Westlake, *Heliophysics Division Director*
Bradley Williams
Lisa Winter
Alex Young
Alan Zide

Other Participants

Emmit Benitez
Francesco Bordi
Pontus Brandt
Emma Bunce
Ian Cohen
David Darbouze
Monte DiBiasi
Tammy Dickenson
Richard Eastes
Veronika Fuhrmann
Lindsay Goodwin
Lewis Groswald
George Ho
Grace Hu
Joo Hwang
Devrie Intriligator
Teresa Jensen
Seth Jonas
Linda Karanian
Haje Korth
Michael Kurtz
James Lochner
David Millman
Bill Murtagh
Louise Prockter
Griffin Reinecke
Amy Reis
Richard Rogers
Elizabeth Sheley
Connie Spittler
Derek Surka
Jesse Woodroffe

Appendix B
Advisory Committee Membership

Paul Cassak, Chair
West Virginia University

Christoph Englert, Vice Chair
Naval Research Laboratory

Janet Kozyra, Executive Secretary
NASA Headquarters

Nicole Duncan, Space Weather Council Chair
Ball Aerospace

Aroh Barjatya
Embry-Riddle Aeronautical University

David Brain
University of Colorado, Boulder

Matina Gkioulidou
Applied Physics Lab
Johns Hopkins University

Farzad Kamalabadi
University of Illinois, Urbana-Champaign

Laura Peticolas
Sonoma State University

Chadi Salem
University of California, Berkeley

Lisa Upton
Southwest Research Institute

Marco Velli
University of California, Los Angeles

Jia Yue
Catholic University of America

Eric Zirnstein
Princeton University

Appendix C
Presentations

1 *Heliophysics Division Update*, Joe Westlake
2. *Discussion and Comments on Space Weather Council (SWC) Report,* Nicole Duncan
3. *Distinguishing NASA and NOAA Space Weather Programs,* Jamie Favors
4. *Europa Clipper and JUICE Missions Cruise Phase Coordination*, Louise Prockter, Emma Bunce
5. *Requirements for Different R&A Programs,* Patrick Koehn
6. *IDEA – Update on Inclusion Plans and Evaluation Procedures in HPD ROSES,* Susanna Finn

Appendix D
Agenda

Heliophysics Advisory Committee (HPAC) Meeting
NASA HQ
February 12-13, 2024

Monday February 12, 10:00AM – 5:00PM		
10:00	Welcome	Dr. Janet Kozyra, DFO, NASA
10:03	Introduction of Committee Members; Overview of Agenda	Dr. Paul Cassak, HPAC Chair
10:06	Heliophysics Division Update (including operating missions)	Dr. Joe Westlake, HPD Director
10:50	Q&A	
11:20	Discussion about potential ways for HPAC to take a deeper dive into some issues	HPAC
12:00	LUNCH	
1:00	Discussion & Comments on Space Weather Council (SWC) report	Dr. Nicole Duncan, SWC Chair
1:40	Distinguishing NASA and NOAA Space Weather Programs	Jamie Favors (NASA)
2:00	Discussion of Present and Future SWC Tasks	HPAC and Dr. Nicole Duncan, SWC Chair
2:40	BREAK	
3:00	HPAC Discussion (Potential issues for findings & recommendations)	Dr. Paul Cassak, HPAC Chair
3:45	HPAC Work Session for Writing Preparatory Material	Closed Session
5:00	ADJOURN	

Tuesday February 13, 9:30 AM – 5PM Room MIC 3A		
9:30	Welcome to Day 2	Dr. Janet Kozyra (DFO, NASA)
9:32	Overview of Agenda	Dr. Paul Cassak, HPAC Chair
9:35	Europa Clipper and JUICE missions cruise phase coordination"	Drs. Louise Prockter (APL) and Emma Bunce (University of Leicester)
10:10	Requirements for Different R&A Programs	Dr. Patrick Koehn (NASA)

10:30	BREAK	
10:40	R&A Portfolio information - What information would HPAC like to request about the R&A portfolio and why?	HPAC Open Discussion
11:10	IDEA – Update on inclusion plans and evaluation procedures in HPD ROSES	Dr. Susanna Finn (NASA)
11:35	HPAC Discussion on IDEA	HPAC Open Discussion
12:05	LUNCH	
1:05	Public Comment	Virtual Only
1:10	HPAC Discussion (Potential issues for findings & recommendations)	Dr. Paul Cassak, HPAC Chair
1:50	HPAC Work Session Preparatory Material	Closed Session
3:00	BREAK	
3:15	Recommendations & Findings Open Discussion	HPAC
4:15	Report out to the HPD Director	HPAC to Dr. Joe Westlake
5:00	ADJOURN	