

NASA ADVISORY COUNCIL
HELIOPHYSICS ADVISORY COMMITTEE

June 30-July 1, 2020

Teleconference

MEETING MINUTES



Michael Liemohn, 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 late due to technical issues.

Overview of Agenda

Dr. Michael Liemohn, HPAC Chair, postponed his comments so that the meeting could start.

Heliophysics Division News, Updates, and New Initiatives

Dr. Nicola Fox, NASA Heliophysics Division (HPD) Director, described the Agency response to the Covid-19 pandemic. NASA is employing a phased approach to operations during the pandemic. Since March 17, all NASA centers, as well as Headquarters, have been in Stage 3 or Stage 4 of the framework. In this scenario, all employees and contractors are on mandatory telework, though exceptions are made for mission-essential personnel. The Science Mission Directorate (SMD) priorities are to keep personnel safe, while also protecting hardware and the integrity of data for operating missions. More specifically, SMD assessed 47 flight projects, determining that most work on those in the development phases can be done virtually. Missions in Integration and Testing (I&T) will continue to the extent possible with small teams. Regarding Research and Analysis (R&A) and Research Opportunities in Space and Earth Science (ROSES) grants, SMD is doing its best to mitigate impacts, especially for grad students, postdocs, and Early Career (EC) investigators.

Specific to HPD, there have been minimal impacts on missions in formulation, though teams are concerned about the inefficiencies inherent in telework and are tracking possible effects. The Division is continuing to monitor operating missions, and multiple sounding rocket missions have been postponed. Many of the R&A panels have been completed, and upcoming panels will be virtual. There have been some 2-week delays in ROSES 20 due dates.

Racism is also a concern, as highlighted by recent events. Dr. Fox shared her thoughts, urging those in the heliophysics community to re-commit and amplify their efforts against racism by taking a stand against small and large injustices wherever they occur. She thanked those who have been thinking further about how to step up NASA's diversity efforts.

Science and Mission Highlights

Solar Orbiter, which is led by the European Space Agency (ESA) with strong NASA participation, launched in February, with the first perihelion in mid-June. Parker Solar Probe (PSP) continues to operate well, observing switchbacks that might reveal information about the solar wind. Shortly after the October 2019 HPAC meeting, the Ionospheric Connection Explorer (ICON) was launched successfully. Dr. Fox described the first light results, in which ICON used the Moon to calibrate the sensor. There are high hopes for the combination of the Global-scale Observations of the Limb and Disk (GOLD) mission with ICON and the guest investigator program. All operating missions are doing well.

The Heliophysics System Observatory (HSO) includes 20 operating missions, with 6 missions in formulation. Sun Radio Interferometer Space Experiment (SunRISE) is a newly selected Mission of Opportunity (MO) in which an array of CubeSats will operate as a very large radio scope. It will launch no sooner than July 1, 2023. The Atmospheric Waves Experiment (AWE) is another MO, selected in 2016, on schedule for Preliminary Design Review (PDR) and Critical Design Review (CDR) later this year. It will launch no sooner than August, 2022. The Division selected two Small Explorers (SMEXes): the Polarimeter to Unify the Corona and Heliosphere (PUNCH) and the Tandem Reconnection and Cusp

Electrodynamics Reconnaissance Satellites (TRACERS). PUNCH had a good virtual review, and PDR will be this fall, as will Key Decision Point-C (KDP-C). TRACERS entered Phase B following successful completion of an Extended Phase A study on April 24. The Interstellar Mapping and Acceleration Probe (IMAP) completed KDP-B review in January and is now moving forward with preliminary design work.

The Living With a Star (LWS) program has a number of operating and future missions. After running out of fuel, the Van Allen Probes were decommissioned. The Balloon Array for Radiation-belt Relativistic Electron Losses (BARREL) is still flying, alongside the Galactic/Extragalactic ULDB Spectroscopic Terahertz Observatory (GUSTO) pathfinder from NASA's Astrophysics Division (APD). The Dynamical Neutral Atmosphere Ionosphere Coupling (DYNAMIC) science will be done through other missions, which Dr. Fox planned to explain later in her presentation.

LWS ROSES opportunities center on Focus Science Topics (FSTs). The ROSES 2019 reviews are complete and announcements are imminent. For ROSES 2020, Step-1 proposals are due August 27 and Step-2 will be due in mid-November. ROSES opportunities will use the strategic capabilities to develop a model focused on several specific Strategic Science Areas (SSAs), which Dr. Fox listed. She noted the recent LWS Program Analysis Group (LPAG) workshop, which elicited comments as inputs for the 2021 ROSES FSTs. Dr. Fox listed a number of LWS initiatives to expand the heliophysics community. The next LWS mission is the Geospace Dynamics Constellation (GDC).

Covid-19 led to some delays in the suborbital and CubeSat area, but Cusp Heating Investigation (CHI) and PolarNOx did launch over the winter, and the Scintillation Observations and Response of The Ionosphere to Electrodynamics (SORTIE) mission was released from the International Space Station (ISS) in February. HPD is looking at how it might launch some of the sounding rockets on the schedule for this year. Those that have been delayed thus far will go up in Fiscal Year 2021 (FY21). The Heliophysics Environmental and Radiation Measurement Experiment Suite (HERMES) has been selected as a payload to fly on NASA's Lunar Gateway. HPD will be seeking community input on space weather instruments and spacecraft to populate future opportunities.

Working Groups, Partnerships, and Decadal Activities

HPD now has strategic working groups addressing space weather, archives, and technology. Thirteen missions are in the 2020 Senior Review (SR). At its previous meeting, HPAC received a briefing on proposed SR changes, which are being implemented. The National Academy of Sciences (NAS) provided HPD with its DS midterm assessment in February, and the Division was happy with the results. Responses were returned to NAS in April, and HPD is now planning for the next DS. To that end, NASA and the National Science Foundation (NSF) had planned a workshop, Heliophysics 2050, which will be postponed until it can be done in person.

PI-proposed partnerships, Partner Missions of Opportunity (PMOs), have not been effective in establishing NASA contributions to missions with international partners. Therefore, SMD will no longer solicit PMO proposals. NASA will allow PI-led Explorer missions to be proposed that include partner contributions of less than 1/3 of the mission, but SMD will be more strategic and seek community input on potential partnerships. Dr. Fox noted that Solar Orbiter has a very successful partnership with ESA. NASA is not backing away from international partnerships, but will no longer do PMOs. SMD has also released its new science plan, an ambitious program for the next 5 years.

R&A and ROSES

The Diversify, Realize, Integrate, Venture, Educate (DRIVE) Program is now part of HPD's R&A baseline. Dr. Fox listed the DRIVE elements. Nine DRIVE Science Centers (DSCs) were selected for Phase 1. As part of an SMD initiative, ROSES is now identifying high risk/high impact proposals. Following another SMD effort, HPD will have its first test of the Dual Anonymous (Dual Anon) proposal

reviews with Heliophysics Guest Investigators Open (HGIO). HPD did a mock ROSES panel to train new program scientists and share best practices for ROSES panel facilitation. Dr. Fox showed the data for ROSES 19, which is coming to a close.

Summary and Questions

HPD has brought in some detailees and is hiring program executives and program scientists. The Division launched five missions in just over a year, and there are many new missions in the pipeline. HPD is also making technology development investments and bringing along the next generation of scientists. It is a great time to be a heliophysicist.

Dr. Liemohn opened the floor for questions. Dr. George Ho asked for more detail about the PMO changes. Dr. Fox explained that SMD sought to take out uncertainty instead of relying on the ad hoc MO process, which does not line up well and is not efficient. This will allow the science divisions to be more strategic. Solar Orbiter is a great model for how to move forward. There will still be calls to participate in international missions.

Dr. Larisa Goncharenko asked for more about the status of DYNAMIC. Dr. Fox replied that HPD is looking at creative ways to return the science of DYNAMIC. For example, the Division is looking at how to fly a complementary instrument at the same time as GDC and capitalize on overlapping measurements. The question is whether NASA can do a streamlined mission that measures things not covered by GDC. The Division would like to return the science of DYNAMIC by taking advantage of assets already in operation. Dr. Paul Cassak noted that HPAC had requested more information on funding rates by proposal. Dr. Fox said that those data were not immediately available, and she would ask Dr. Mona Kessel to provide them. In answer to a question about how to participate in international partnerships, Dr. Fox said that the best route is to contact her or Dr. Dan Moses at HPD by email or phone to discuss it. The Division will then pursue it internally and determine if a call is warranted.

In answer to a question about AI, Dr. Fox noted that students can apply to the Frontier Development Lab in the summer and be paired with a mentor. In addition, SMD is setting up a team to look at how to maximize and embrace AI, and incorporate it into research calls so that it is better integrated and has more platforms available. Each division will have membership on this team, and she would provide additional information when she knows more. Dr. Goncharenko observed that in the previous week she participated in a virtual meeting about GOLD and ICON measurements. She was quite pleased with the call and is looking forward to getting the data. Dr. Fox said that she was excited to see a partnership between ICON and GOLD.

Space Weather Strategy, Space Weather Council, Instrumentation RFI

Dr. James Spann discussed the Space Weather Strategy and related activities. NASA has a role within the 2019 National Space Weather Strategy, and one of the strategies in the NASA Science Plan is to develop a target-user focused approach to space weather. Dr. Spann described the Strategy's vision and mission, then reviewed the six goals. The first three, to observe, analyze, and predict, are intrinsic to NASA's approach to heliophysics, and all apply to space weather. The fourth goal is to transition research to operational environments, with support and partner being the final two goals. Dr. Spann then reviewed each goal in detail.

“Observe” requires that NASA advance observation techniques, technology, and capabilities. This encompasses instrument development and pulls in all of the great heliophysics programs that NASA already has, with a sustainable recurrent flight cadence and supporting infrastructure opportunities. The flight opportunities may include rideshare opportunities, instrument opportunities, or a NASA-led pathfinder mission. The need is to ensure the availability of real-time and latent data streams for space weather observations.

The second goal, “Analyze,” calls for NASA to advance research, analysis, and modeling that would advance space weather understanding and prediction, and to support the development of improved data analysis and modeling capabilities, in collaboration with national and international partners. The “Predict” goal calls for improved space weather forecasting capabilities. The fourth goal, “Transition” to operational environments, is meant to shift the results of NASA heliophysics research and technology programs to a space weather proving ground environment in which models and techniques are assessed. NASA will coordinate with the National Oceanic and Atmospheric Administration (NOAA) in establishing a testbed capability, and will work with the Department of Defense (DOD) and other Federal and international partners to exchange data and observation capabilities. An example is HERMES, which will provide real-time data streams. For the “Support” goal, HPD will provide the Human Exploration and Operations Mission Directorate (HEOMD) with expertise on space environment conditions that enable the health and safety of astronauts beyond low-Earth orbit (LEO).

Finally, the goal to “Partner” will go beyond the Agency. As part of this, there is a proposal to set up a subcommittee to HPAC, which will advise on matters relevant to space weather. There is also an effort to assess gap analysis, and NASA will provide real-time data to other Federal agencies for forecasting, nowcasting, and anomaly resolution, while continuing activities with the Office of Science and Technology Policy (OSTP). International coordination involves such entities as the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS). Specific activities include coordination with ESA on the Lagrange mission and discussions with the Canadian Space Agency (CSA) about the Arctic Observation mission. Other joint projects are likely. Dr. Spann would like to see those discussions at the Agency level in order to have the gravitas of decision-making and funding capabilities.

As for the coordination challenges, some agencies, like DOD, operate in very different environments, so both sides must find the best way to have the needed discussions. Almost everyone is pushing in the same direction, there is a good communications environment, and he is optimistic. Dr. William Matthaeus said that there was a recent multiagency initiative to outline the needs of neutron monitors. Dr. Spann said that at OSTP, NSF is taking the lead on this and will be reporting to Congress. NASA is not a major player in that area.

The Space Weather Council (SWC) will be the subcommittee to HPAC. Dr. Thomas Zurbuchen, SMD Associate Administrator, had just been given the paperwork on this. SWC will be an interdisciplinary forum for soliciting community analysis and input. It will report to HPAC, which will pass along findings and recommendations to HPD. SWC will also be required to respond to actions levied by HPAC. The plan is to have an HPAC member as chair, with 10 to 12 members total. As a subcommittee, SWC will fall under Federal Advisory Committee Act (FACA) regulations, and all members will be Special Government Employees (SGEs). The rationale for doing it this way rather than as a Program Analysis Group (PAG) is that a FACA group will enable the interagency context, with more formality and impact.

Dr. Spann next described the Request for Information (RFI) for Space Weather Instruments and Missions for Science (SWIMS). This will go out to the community to assess interest and obtain concepts and rough order of magnitude (ROM) costs for small complete missions, instrument suites, or single instruments that might directly address space weather science and/or observational needs. He did not have a date for the RFI, but it was imminent.

HERMES is one of the first two payloads that NASA has selected to fly on the Lunar Gateway, the other being the ESA Radiation Sensors Array (ERSA). The timescale is very short, which necessitated some changes, but HERMES will enable meaningful heliophysics in the areas of Solar Energetic Particles (SEP), solar wind structures, and magnetotail dynamics. Dr. Spann described the various instruments, noting that this is a first step to creating a pipeline of instruments to fly on various platforms. The RFI

will seek additional instruments and is not restricted to the Gateway but rather could include anything to fly as a secondary mission.

Dr. Spann next discussed space weather Operations to Research (O2R), some of which is funded by NOAA, though most is funded by NASA. There were two calls in 2018. Selections from the 2019 open call are imminent. Also in 2019, NSF and NASA had a joint call on space weather quantification of uncertainties, which is run through the NSF process. NASA will have a 2020 call on ionospheric disturbances and satellite drag, with Step 1 proposals due in December and Step 2 due in mid-February. The agencies are coordinating all of these calls, including the Small Business Innovation Research (SBIR) awards, which Dr. Spann described.

Next steps start with an implementation plan to accompany the strategic plan. A NASA Space Weather Science and Applications (SWxSA) team will help develop that plan. This team includes representation from across NASA. There will also be a science and measurement gap analysis. Space weather has a lot of buzz across many agencies and Congress, and the community is now understanding it as a valuable activity. It will be part of the portfolio from here on out. It is important to note that the O2R process is cyclical and will capture anything used in operations and involving research.

Decadal Midterm Responses

Dr. Liemohn said that because the start of the meeting had been delayed, he wanted to take roll of the members, which he did now. All were present for at least part of the meeting. He then shifted to the DS Midterm Report from NAS, and the NASA response. Dr. Tomoko Matsuo cited Recommendation 3.1, for NASA and NSF to continue using the DRIVE framework and program elements. She wanted more detail on how the DRIVE call will go out. She was also concerned about the effort to do DYNAMIC science with existing missions. Since there was no accompanying budget, it was hard to gauge the response. Ms. Margaret Luce said that HPD had presented the current budget at the previous HPAC meeting, there was no Congressional markup of the FY21 President's Budget Request (PBR), and NASA was not at liberty to discuss the proposed budget for FY22.

Dr. Cassak thought the midterm responses were good, though he had a couple of concerns. He felt the responses to the recommendation about training the next generation were vague and avoided the actual recommendation. He also thought the response to Recommendation 3.3, about the cadence of Explorers, was incomplete. Ms. Luce noted that HPD would be keeping to the cadence of 3 years. Dr. Cassak thought that the language on diversity could have gone further, and that NASA should be pursuing more in this area. There was discussion about HPD funding lagging other divisions, though this was not in a recommendation. Dr. Lindsay Glesener also thought the language on diversity was vague and did not link to anything in the near term. It is a hard issue to tackle, but it has taken on far more urgency. She wondered if there were any recent developments at NASA. Ms. Luce said that Dr. Fox is passionate about this and would have an answer. It is a difficult problem, and there are ideas under discussion. Within SMD and HPD, the focus is on EC investigators, and through that effort, the Agency hopes to promote diversity and inclusion. It is also true that proposals do not address the demographics of proposers. Dr. Goncharenko said that not long ago, the American Geophysical Union (AGU) did some demographics work that is on their website. NASA and astronomy in general are doing poorly compared to others.

Dr. Mattheaus said that in all of these matters, there is a pool of candidates, and while those who evaluate the candidates need to eliminate selection bias, they do not control the candidate pool. That leads to the pipeline, which is where there are a lot of tough problems, and NASA needs to do more to encourage young people from underrepresented groups. He saw nothing about these issues in the midterm report or the response. Dr. Ho noted that HPAC had asked SMD for demographic information. Dr. Fox said that HPD is active in a cross-divisional effort on demographics, for which SMD has engaged with NAS.

Another comment addressed Recommendation 6.1 on advance planning for the next DS. It would be good to get some development money in advance to determine more about feasibility and affordability. Dr. Klimchuk noted that DRIVE was the highest priority in the previous DS, which advised HPD to expand the R&A program, now up by \$40 million. It would be good to know the funding of all components of the R&A program and how they have changed over the DS period. Dr. Fox said that while DRIVE is very important, there has been no diminution of focus on the other R&A elements. Those data are typically part of the HPAC meeting and will be available at the next meeting.

Dr. Cora Randall asked about the process for determining small missions that might help augment existing measurements that will compensate for the lack of the full DYNAMIC mission. Dr. Fox said that since HPD does not have the budget for the full mission, the Division is looking for creative ways to get the missing measurements in a much cheaper way, and this could be through a SMEX or similar small mission that is affordable. Dr. Randall next observed that she perceived that NASA or the DRIVE program rely more on NSF for pipeline education. She was thinking specifically of K-12 levels. Dr. Fox explained that NASA used to have a robust K-PhD education program that is no longer in place due to a change in the Agency mandate. In existing education efforts, one of the major evaluation criteria is diversity. HPD is discussing how to better open its technology program to institutions that do not have support for heliophysics, and how to make connections. She is passionate about trying to broaden many different areas and wanted input from HPAC so the Division can move forward. SMD is focused on diversity and inclusion, trying to look at what NASA can do other than talk. She asked that HPAC discuss this to pass along any lessons learned and ideas, or even have a follow-up meeting.

It was noted that on the career enhancement recommendation, definitive goals and metrics are missing. Dr. Ho said that for Recommendation 3.3, the charter of the midterm was to comment on this DS and not other documents. But Dr. Fox had previously talked about having a working group to look at the various mission sizes across the portfolio, and he wondered if there was an update on that. He believed this related to Recommendation 3.3. Dr. Fox said that the group did a great job, and they looked at the budget in terms of distribution of mission sizes in relation to the overall profile, resulting in a good planning tool that will be very helpful, especially with the next DS. Dr. Jared Leisner led one on the difference between LWS and Solar Terrestrial Probes (STP). The current DS guidelines have them separated more by cost cap than type of science, but not all LWS science needs to be of a certain size, while some of the STP missions might need to be big and exciting. Dr. Leisner's group produced a framework for focusing more on the science, away from the artificial barriers. There is a lot going on and she hopes to get feedback at the next meeting.

Dr. Mattheaus said that everyone likes to see EC investigators and first-time PIs do well, but it is possible to go too far on that. The mid-career people are part of the pipeline of bringing the young scientists along, and it is important not to lose that. The different levels are necessary to have a balance. Dr. Mari Paz Miralles said that the response to Recommendation 3.2 was not that strong in regard to ground-based support. Dr. Fox said that NASA works closely with NSF and has regular discussions on support and leverage. NASA put out a call for ground-based support and does support ground observatories. There are powerful benefits of combining space and ground-based observatories. She would like to do something with the GOLD and ICON partnership. She does not want to miss an opportunity, and she apologized if the wording was vague. Dr. Glesener said that while the pipeline is important, it is also crucial to pay attention to the culture in the various science communities.

Ms. Luce said that on the HPAC website, there is a presentation from the October 2019 meeting that has the R&A program the funding history broken down as requested. It shows the increases from \$55 million in FY15 to \$170 million in FY19. This presentation is relevant to the diversity discussion as well, and HPAC may want Dr. Kessel to give an update at the next meeting.

Decadal Planning Activities

Dr. Leisner explained that in 2019, NASA, NSF, and NOAA began discussing preparations for the next DS. Everyone is essentially on the same page. In addition to community preparation and NASA-supported mission concept studies, much of the planning centers on the Heliophysics 2050 workshop, which will provide authors of white papers with an opportunity for structure and connections. The format is still being developed, but NASA wants to push boundaries in order to advance and expand the science, while also addressing relevant programmatic topics. Current plans are to have the workshop in May, 2021, with a virtual attendance option. There will be a parallel set of plans in case the public health situation requires something else. The call for self-nomination to join the organizing committee just went out, and the science organizing committee will be active before the workshop. NASA hopes the workshop results in short-, medium-, and long-term strategies for heliophysics. The deadline for workshop white papers is early September.

Dr. Ho thought the timeline for white papers was short. Dr. Leisner said that the organizing committee will use them to determine common threads and paths for advancement and growth. At that point, they will reach out to the community to write summary papers to help the committee form the framework for sessions and discussions. Dr. Ho was concerned about this, stating that anyone who writes a paper should be able to present it to the community. Dr. Leisner said that the effort will be one of curation for plenary sessions, but the team wants to ensure that community discussions are open and inclusive, while pushing boundaries. He would confirm that the web page was set up for access to the white papers.

Both APD and PSD have funded mission concept studies ahead of their DSEs, a process that HPD is watching. One consideration is the need to feed technical information into the Technical Risk and Cost Evaluation (TRACE) process, previously known as the Cost and Technical Evaluation (CATE) process. If the choice is made to go in that direction, HPD will want concepts reflecting community notions of compelling science and exploration of new mission concepts that meet the TRACE threshold but do not exceed it. This presentation is part of communicating with the community. Leading up to the DS process, it can only benefit to make everyone as aware as possible and provide resources for information. The previous DS discussed the state of the profession, which APD and PSD are doing now and which HPD is considering. SMD is discussing the health and vitality of the science community with NAS. As part of this, a study on demographics is likely. Another topic of community interest is the research budget. Preparation time can be long, and not all information will be available in time for the DS. NASA is trying to identify the long-lead items now in order to address short-term requests. The team has followed up with the Committee on Solar and Space Physics (CSSP) to determine how to identify those issues. The agencies ask a lot of NAS, and there is a lot that outside observers cannot see. All of those things feed into the discussion, and it is better to prepare than to be caught off guard at a meeting.

Dr. Matsuo asked how the DS guidelines might play a larger role in making the field more diverse and inclusive. Dr. Leisner said that when he was in PSD, he saw what did and did not work in the diversity of people presenting, etc. One focus of HPD and the Heliophysics 2050 workshop is ensuring that what they do leads to diversity and inclusion as much as possible. He noted that NAS does not limit who can serve on the DS and wants diverse representation. However, they are only able to bring in people who are nominated or self-nominated. The PSD workshop told people how they can qualify and how to see themselves as qualified. HPD will have webinars similar to those of PSD, but they are not yet in the planning stages. He would try to get the PSD webinar links.

It was noted that those webinars were very helpful, but for the previous heliophysics DS, it seemed that selection of panel members was a black box. By contrast, PSD was open, and it would be good for HPD to emulate that transparency. There was agreement among HPAC members that the process needs to be different. Dr. Matsuo said the message to be open is very important, adding that if you do not look like someone, you do not imagine you could be where they are.

Dr. Leisner clarified that the white papers due in September are for the Heliophysics 2050 workshop, while the white papers for the DS will be due next year. The workshop white papers will be shorter and focused on connections between science and areas for advancement and growth. From there, the organizing team will identify potential workshop topics. NASA is very aware of how difficult things are with the pandemic. There will be people with less time to work. The hope is that those who are able will reach out to their colleagues, and include and support them as much as possible. This is not a replacement for the DS; the workshop outputs might not even be discussed in the DS. The point is to help the community have the discussions. Those who find they are not able to write a paper will be encouraged to attend the workshop and have their discussions to amplify their voice.

Dr. Liemohn said he was glad to see them start early on the demographic and workforce issues. Dr. Leisner said that the team wants as much data analysis as possible. He cautioned that Federal agencies operate under constraints and may not be able to do exactly what is requested. Regarding the TRACE process, the main consideration is that of technology limits. The Heliophysics 2050 workshop will focus on the science. More important than implementation will be discussion of the needed capabilities and the goals in scientific understanding. The organizing committee will emphasize science. Dr. Fox added that the team will not throw out any white papers. However, the discussion needs to be about more than just missions, and she does not want to get stuck on the technology behind a mission. Dr. Ho advised making a clearer distinction between the workshop white papers and the DS white papers. Dr. Glesener added that the very term “white paper” connotes exhaustion to many within the community.

HPAC Work Session

Dr. Liemohn thought the letter to Dr. Fox called for a paragraph about the DS midterm response. Dr. Matsuo noted that there had been a lot of discussion on diversity. In addition, regarding the Covid-19 response, the disease is having greater impact on people with children, as well as underrepresented groups. Dr. Fox said that SMD is discussing how best to support the community, including the underrepresented communities. This is a bizarre time, with unique challenges. There are people who are isolated and experiencing a lot of difficulty. NASA wants to provide support, and to that end, they are listening to the community.

Regarding HPD’s response to racism and the need to increase diversity, it was noted that this is probably the most important issue on people’s minds now. Dr. Ho added that Covid-19 disproportionately affects disadvantaged groups. Dr. Matsuo said that it is important in terms of the pipeline to support the students in the field. Dr. Mattheaus observed that there seemed to be two threads here. First was the pipeline issue, which could use some creative thinking. The other thread had to do with outcome bias, which calls for ensuring that the field is doing its best with the existing pool. He noted that research grants once had public outreach components, and he would not mind seeing that supplement reinstated. Dr. Fox cautioned that it is hard to get into classrooms these days. NASA does have a science activation team, and there are creative ways of bringing science to learning environments.

Dr. Liemohn assigned Drs. Matsuo and Glesener to write the Covid-19 piece. Drs. Mattheaus and Goncharenko were to write about the pipeline, and Drs. Cassak and Glesener took on diversity.

It was noted that HPAC wanted an update on open data and software, which was not on the agenda but might be discussed at the next meeting. Dr. Ho said he would like updates from the strategic working groups at the next HPAC meeting as well. Dr. Matsuo suggested hearing more about some of the big data issues and related funding. Regarding DYNAMIC, Dr. Ho said he wants to hear about the large and small missions that will do some of the measurements, likening it to “fitting 10 pounds of potatoes into a 5-pound bag.” Dr. Liemohn said he heard that HPD would maneuver part or all of DYNAMIC into a smaller budget box to overlap GDC. He made note of the requests for the next agenda.

Dr. Bishop said she was happy to see the progress on space weather and the likely subcommittee on the topic. She is concerned about hidden obstacles, but she trusts Dr. Spann to tackle them as they come. She and Dr. Ho were to write the HPAC finding on the topic.

Dr. Liemohn said that the letter would state that HPAC was glad to see HPD being proactive in approaching the DS. Dr. Ho noted that the Division update did not have a budget chart. Dr. Fox said that nothing had changed since the last meeting, and there was nothing new to share. Regarding selection of DS committee members, that is entirely up to NAS. HPD will ensure that the HPAC concerns about representation are in the statement of task.

Dr. Matsuo asked if they could say something about the visa situation and foreign students. Dr. Fox said that that is not a NASA policy. It is a concern, but there is nothing HPD can do other than state that it affects the pipeline. However, that did not mean HPAC should leave their feelings unstated; they could write it as a concern. Dr. Liemohn said that Dr. Klimchuk was going to write about a process NAS can follow for the DS. Dr. Ho would help him on this.

Dr. Ho said he would like an update on the PMO and international partners at the next meeting. Dr. Fox said that she is working with Dr. Paul Hertz of APD on the best way to move forward with this SMD-wide policy. Solar Orbiter was done at a strategic level and was very successful. It was also much more efficient without a lot of wasted proposals. SMD wants to remove the uncertainty and the work on things that will not happen or align. She added that HPD cannot develop a process for NAS. HPAC can provide recommendations for the statement of task, however.

Adjourn

The meeting was adjourned for the day at 5:18 p.m.

Wednesday, July 1, 2020

Introduction

Dr. Kozyra welcomed the meeting participants and reviewed the FACA rules. There was to be a public comment period, but otherwise only HPAC members, presenters, and NASA personnel were to speak. Minutes were being taken for the public record, and all discussion was on the record. Members with conflicts of interest (COIs) were to recuse themselves from discussion.

Overview of Agenda

Dr. Liemohn reviewed the agenda and called roll of the HPAC members.

Rideshare

Ms. Alicia Mendoza-Hill explained that following a detail to HPD from NASA's launch services, she is now permanent with the Division and also serves as the SMD rideshare lead. HPD will be heading SMD's rideshare effort, which was established via a rideshare policy in 2018; that policy was amended in 2019. She is leading the effort to implement the policy and enable the opportunities. This was unveiled at the Access2Space workshop in February, co-chaired by SMD and the Applied Physics Lab (APL). In addition, CSSP just issued the initial findings from a report on short-notice rideshare opportunities. The IMAP mission will be first major HPD mission to implement this policy, with the Small Innovative Missions for Planetary Exploration (SIMPLEx) Lunar Trailblazer and NOAA Space Weather Follow-On

L-1, along with two heliophysics MO payloads. ESPA-class rideshare has tremendous potential for NASA to increase science return and science technology maturation.

Ms. Mendoza-Hill described the rideshare organizational structure. The plan is to develop guidance for both SMD and PIs. The February Access2Space workshop was held to elicit community input and to develop a secondary pipeline for ESPA-class missions. There were 154 participants from academia, industry, and NASA. Although there were presentations, the emphasis was on splinter sessions and subgroup discussions. These were organized to build upon each other. There were a number of outcomes, and a full report will be available to the community by the end of summer. Ms. Mendoza-Hill noted that soliciting ESPA payloads directly with the AO primary mission was preferred over matchmaking payloads to primaries later. Dr. Glesener complimented the initiative and asked if there would be any efforts to continue getting input. Ms. Mendoza-Hill said that the team is still putting this together, but they do plan to have more workshops, and there will be a session at AGU as well.

IMAP will have four payloads on an ESPA Grande. The IMAP launch service procurement is in process, and she hopes to know the launch vehicle by the end of the year. A graphic showed the fairing diagrams with mass capacities. There are six SMD missions lined up for rideshare options, and six more potential missions. These opportunities have been posted to the community. A chart showing the notional milestones for secondary payload integration demonstrated what is involved in the matchmaking process. This information will help strategize and will aid in procurement.

Dr. Vassilis Angelopoulos said that NASA has come far in a few years. He noted that the missions listed are all on a primary that goes to a specific location. NASA could underwrite procurement of an ESPA with a solid inside of it and create a generic interface to take payloads of any launch to an orbit. This would create all kinds of opportunities and could be a potential next step, but it did not seem to be part of the workshop. Ms. Mendoza-Hill said that SMD is discussing how to look at the untargeted strategies, as well as the technology of the solid or propulsive ESPAs. There is some necessary industry work on propulsive ESPAs, but the costs are high at the moment. NASA is looking at all the different strategies to enable rideshares. The Psyche mission will be challenging in terms of trajectory changes, so the rideshare system will need to get the payloads to their desired locations. Dr. Angelopoulos described how to line up the third stage controls to handle this. It does not have to be extremely accurate, so the secondaries can use their own fuel to go where they need to. It enables a whole area of science. Ms. Mendoza-Hill said that the Joint Polar Satellite System (JPSS) mission had to change its propulsion and add capabilities to enable secondary payloads. SMD is working with the launch services program to enable capabilities with more options.

Dr. Ho observed that HPD can benefit quite a bit from this and asked about instrument development and timelines. Dr. Fox said that HPD will look at offering rideshare opportunities through R&A, possibly as early as next year. There will be periodic calls. If a rideshare is ready, the question then becomes the point at which it is too late. If there is a payload, when can it be ramped up and added? HPD wants to make rideshare an option space within ROSES as soon as possible. Dr. Liemohn noted the workshop finding that small instrument technology programs are feeder programs into smallsat missions and should be continued or expanded. Ms. Mendoza-Hill said that everyone at the workshop had a different opinion on this. The PIs said that if they knew where they were going, it would make their proposals easier to design. Others just want an open spot.

Dr. Angelopoulos said that a solid inside the ESPA to control from the third stage obviates the need to build the avionics on the third stage. This provides access to a new realm of possibilities. Dr. Roshanak Hakimzadeh said that Heliophysics Flight Opportunities for Research and Technology (H-FORT) solicits rideshare opportunities. This will be shared in the technology strategic working group. Rideshare is built

into it to advance technology. She hopes to have more solicitations to use rideshare opportunities through Heliophysics Technology and Instruments Development for Science (HTIDeS) and H-FORT calls.

Discussion

Dr. Klimchuk noted that the DS midterm review suggested that the next DS give direction on what to do in optimal and nominal/baseline funding situations. He wanted to know why NASA pushed back on giving the two types of budgets. Dr. Fox said that there are pros and cons that HPD will discuss with NAS directly as part of the DS preparation. Dr. Goncharenko said that with Covid-19 affecting responses and resources, HPD should consider worst-case scenarios. Dr. Fox replied that it is hard to judge the impact of Covid-19 at this point, and she is reluctant to say that certain things do or do not happen because of it. She wants to think big and look to the future with ambition. It would be sad if Covid-19 changed the DS goal. If it changes reality, HPD will deal with it, but she would not want it to dampen the enthusiasm of the next DS. She considers it her job to deal with the constraints and issues. The DS is the source of the big goals, the stretch goals. She wants it to discuss more than can be done. Dr. Klimchuk agreed that there is call for optimism, but he would like to see defined decision rules from the start.

DRIVE SCs Update

Dr. Kozyra discussed the current state of the DSCs. HPAC provided valuable input when HPD was developing this program. There are nine DSCs, with multiple goals. Centers are meant to provide cutting-edge science during the 5-year lifetime of the award, while relying on teams that are diverse, interdisciplinary, and creative. HPD wants the centers to be agile enough to switch approaches if something does not work. They also need a supportive infrastructure and management system that enable creative and substantive activities aimed at broadening impacts. There should be potential for impacts on other fields, and a rationale for a center approach. Dr. Kozyra reviewed the Phase 1 considerations, and listed some of the expected types of Phase 1 activities. Team formation activities include filling expertise gaps, developing team roles and responsibilities, aligning individual goals with overarching team goals, and more. Phase 1 projects can apply for Phase 2 support during their second year. Both phases will require Agency reviews, possibly including on-site visits.

Dr. Kozyra presented a graphic describing each Phase 1 DSC's focus, with kickoff dates, one of which was pending. The first part of the NASA kickoff was in mid-June. At that time, NASA introduced the DSC PIs to each other, set a goal of an open atmosphere, established what the Agency is looking for, and talked about what is next. There will be a panel of NASA center directors speaking at the next kickoff session, and there will be a session on collaborative planning activities. The high level schedule shows the staggered performance periods that reflect how DSC funding came on; this is causing a bit of difficulty. Phase 1 activities include prototyping, strategic planning, and program evaluation planning.

After the first year, each DSC will be required to produce a report with a strategic plan. A panel will evaluate the latter and feed it back to the DSCs. NASA has provided a template for the strategic plans, which the DSCs can modify. The strategic plans will help DSCs foster an identity; set priorities and assign tasks; encourage alignment; identify potential partners and collaborators; recognize "misfit" projects or activities that are not scalable or collaborative; address potential issues; and prepare for Phase 2. Dr. Kozyra listed the program evaluation metrics for the second year. Evaluation throughout the DSC lifetime by an external science center advisory group could be built into the process to ensure quality and give objective perspectives. NASA has provided a collaboration planning framework to aid in team formation, which is necessary to develop an effective science team. This has been affected by Covid-19, so HPD has employed an OSTP report and methodology. One program resource is the Toolbox Dialogue Initiative (TDI), which will provide ongoing consulting. Dr. Kozyra showed an example of a 10-point collaboration plan. Next steps focus on continuation of the kickoff process and setting up TDI input for DSCs that request it.

Dr. Angelopoulos asked for clarification about DSCs being potentially eligible for a 5-year extension while also being on an equal footing with others for Phase 2. Dr. Kozyra said that the original vision was that the DSCs could solve a problem in 5 years. To extend the centers, they need a new aspect or problem related to the present center. Otherwise, they would be coming back as Phase 1. Dr. Mattheaus was unclear about the partitioning between the science content and the organizational element in regard to evaluation. Dr. Kozyra explained that Phase 1 DSCs were selected mostly because of the proposed science. There was a panel that looked at science and another that looked at organization, but the main thing is cutting-edge science of value. The teams are important in innovation and solving problems, however. If a team is not formed right, the members will not participate fully or be fully integrated. The innovation aspect is very important. Proposers were to assemble the kind of team to integrate the components to attack the science question. In Phase 2, centers must identify what is cutting edge and how they will attack that part of the science question.

GDC Update

Dr. Leisner recapped progress on GDC, HPD's next LWS strategic mission. When the Science and Technology Definition Team (STDT) delivered its report to HPAC at the previous meeting, the Committee accepted the report and recommended an implementation study, which HPD has begun. GDC has two basic science goals, to understand how the high-latitude ionosphere-thermosphere (IT) system responds to variable solar wind, and to understand the internal processes of the IT system. A baseline mission will address both goals, while a threshold mission will emphasize the first. The STDT had three levels of science objectives, with associated science requirements, measurements, and spatial-temporal scales. As recommended by the last DS, GDC will study the large-scale structure.

HPD is looking at how different missions work together, and while GDC has core science that is not addressed elsewhere, the science of other missions will feed into and complement GDC science to move the field forward. In addition to heliophysics missions, HPD is looking at how GDC might relate to the Agency priority of a return to the Moon. The mission will encompass the science aspect of Artemis and be part of the space weather approach. Pre-formulation efforts focused on science and technology requirements. The science requirements flow into mission requirements, and an understanding of technical risk is key to avoiding issues later in the development cycle. A two-pronged approach will be part of mission design, leveraging commercial capabilities. GSFC is looking at the methods other missions have used to maximize science return. The mission concept review will be in July. Dr. Leisner showed the notional constellation configuration. Each pair of spacecraft is connected by a single line, creating triangular relationships. Dr. Leisner noted that while he would be happy to provide HPAC with further updates, it could be that a NASA commitment to the project may limit what he can say.

Dr. Angelopoulos asked how the feedback from science comes into play and whether it is iterative with the cost evaluation. Dr. Leisner explained that GSFC took the STDT report as a basis for developing modeling tools. Once that was done, the baseline of six spacecraft was established. GSFC did multiple parallel costing efforts, then looked at additional measurement capabilities. The team is led by engineering and science team members both. The study scientists have a moderate-size group to ensure that every potential engineering solution meets the science requirements.

Public Comments

The meeting was opened to members of the public for comment, but no one came forward.

HPAC Work Session

Dr. Liemohn reviewed the assignments from the previous day. Dr. Angelopoulos wanted to add more about introducing solids on ESPA rings. Dr. Ho pointed out that the workshop included a separate session on propulsive ESPA rings that are not tied to the primary. It was a game changer.

Dr. Matsuo read the recommendation on Covid-19, which emphasized that HPD should consider the childcare needs of the heliophysics community. Dr. Randall suggested a reference to those who are at high-risk for the disease, and Dr. Goncharenko noted that there is evidence that the workplace repercussions are greater for women than for men. This has long-term consequences for careers.

Dr. Cassak read the recommendation on racism. HPAC acknowledges what HPD has done thus far, but it does not go far enough. HPAC therefore recommends a range of actions such as broader participation with predominantly Black institutions, incentivizing outreach, bringing in Black students for special programs, funding for Black heliophysics faculty at predominantly Black institutions, and improved training on implicit bias. HPAC advises HPD to seek external research and expertise in this area, and to carry successful approaches to other minority populations. In discussion, HPAC members talked about whether there should be more emphasis on other minority populations, and if that might dilute the recommendation. It was agreed to keep the focus on Black students, faculty, and researchers. Dr. Fox noted that NASA is working on this at many levels.

Dr. Randall read the recommendation about DYNAMIC, which stated that HPAC is disappointed that the mission will not occur but appreciates HPD's efforts to obtain the measurements in other ways. The Committee recommends that HPD obtain community input on how small missions might augment these measurements. In discussion, HPAC noted the additional missions involved.

Dr. Bishop read the space weather finding that she drafted with Dr. Ho. It stated that HPAC appreciates the work done in this area but is concerned about potential organizational obstacles and the use of the O2R acronym. The point about the acronym was left for further wordsmithing via email. Dr. Klimchuk read the recommendation that NASA seek to ensure diversity on the panels for the upcoming DS. Dr. Glesener pointed out that since NAS controls selection, the recommendation should be that HPD communicate this to NAS.

Dr. Angelopoulos said he wanted to nudge HPD in the direction of ESPAs with solids. He believed this got lost in the workshop, and the presentation mentioned targeted launch opportunities. The field should be going to standardized interfaces, which would offer the greatest science capabilities and potential, as has been the experience with CubeSats. This is low hanging fruit and does not require expensive avionics design, unlike a fueled ESPA. The primary would need additional throw weight, but there would be no added cost. The NASA office that deals with CubeSats is well versed in this already. Dr. Ho pointed out that this is more expensive than Dr. Angelopoulos said, and the primary drives the rules. It still warrants study, however. The rideshare office will need to make some matches. Having standards would be good, as discussed at the workshop. Regarding CubeSats, once they were standardized, some of these issues were no longer of concern.

Dr. Mattheaus read the recommendation that he and Dr. Goncharenko wrote about the DS, the need for greater diversity, and the pipeline. It is necessary to split racial and gender diversity into two findings; this recommendation focuses on the latter. Heliophysics lags other Earth and space sciences in gender diversity at all career levels. HPAC urges HPD to address this. There is an education and outreach component to this, as well as a retention component that includes workforce mentoring, benefits, and more. Dr. Mattheaus noted that the recommendation touches on a number of axes. In discussion, Dr. Goncharenko urged HPAC to be mindful that they cannot ask HPD to solve all social problems. She was concerned that the Committee might become too diffuse in its focus. Dr. Ho cited paid internships as a way to bring in students. This creates a social advantage, and HPD could do it. Dr. Goncharenko said that she was also concerned about losing people in early and mid-career stages. This is more of an issue with heliophysics than other disciplines. HPD should be intentional and show leadership.

Dr. Cassak read the HPAC responses to the midterm assessment, which noted three issues: 1. Funding for HPD has not kept pace with that of other NASA science divisions, and HPAC wants SMD to report back on this; 2. The responses to the recommendations on diversity were inadequate and need to be improved; and 3. HPAC would like a statement supporting the midterm assessment's recommendation to continue the Explorer cadence.

Dr. Cassak read another finding, in which HPAC commended HPD for sharing information about the grants program and requested further information regarding Step 1 proposals. Dr. Goncharenko was concerned that the request would create additional admin work for someone in HPD and she was not aware of issues with Step 1 proposals. Dr. Glesener said that while Step 1 is not a downselection, it would be good to have the numbers. Another member countered that the numbers do not reveal why proposers might choose not to go from Step 1 to Step 2. Dr. Randall said that it is typically the proposer's decision and that they were asking for NASA to do more work. She was against the recommendation. Dr. Mattheaus said that HPAC would not get much out of these data.

HPAC Report Out to HPD Director

Dr. Liemohn said that HPAC would edit the report offline over the next week or so. He then asked the members to summarize their findings and recommendations for Dr. Fox. Dr. Matsuo said that regarding the Covid-19 response, HPAC is pleased that HPD has taken mitigation measures, but there are areas where the Division could do more, especially for those who are high risk, have families at high risk, are caring for small children, and are international scholars. She noted the funding recommendations as they relate to the pipeline issues.

Dr. Mattheaus read the pipeline finding and described some of HPAC's suggestions of creative things HPD might do, emphasizing diversity, retention, inclusion at various career levels, advanced mentoring, and other strategies. Dr. Cassak read the recommendation that HPD take the initiative to make the community more equitable for Black students and scholars. Dr. Fox said she was pleased to see all of the suggestions on how to do this. There are real programs the Division can access rather than recreate things.

Dr. Liemohn said that HPAC wants to hear from the strategic working groups Dr. Fox mentioned. Dr. Randall read the finding about DYNAMIC, stating that while HPAC is disappointed that the mission has been found to be unaffordable, they are glad the science is being prioritized. Dr. Fox said she appreciated the endorsement to get community input, and she wants to get a bit further with GDC to see what it will provide. Dr. Liemohn then said that HPAC was glad to hear about the R&A program. Dr. Cassak explained the recommendation to get more data on the funding rate.

Dr. Bishop thanked Drs. Spann and Fox for the space weather efforts and said that HPAC looks forward to seeing the SWC come together. She explained the recommendation on labeling O2R. Dr. Liemohn then said that HPAC enjoyed Dr. Leisner's presentation on DS planning, noting the decision rules. There were two recommendations stemming from this. Dr. Klimchuk said that HPAC wants the DS committee selection process to be transparent and representative. Dr. Cassak added that HPAC wants guidance on what they can do to help HPD get its funding adjusted. HPAC talked about the workforce, and there is interest in the cadence for Explorers. Dr. Fox asked if HPAC felt the midterm panel was composed well. Dr. Liemohn said that that was the group the Committee had the issue with, as it was less representative than the committee for the full DS.

Dr. Angelopoulos read the recommendation that HPD look at standardization for rideshares, with solids creating new opportunities for secondaries. Dr. Liemohn noted the DSC and GDC presentations. Dr. Fox said that she appreciated the input and the thoughtful findings and recommendations. She thanked everyone for participating, adding that she would like HPAC to have a more regular cadence of meetings. Dr. Liemohn said that the next meeting will be in September or October. HPAC will also need to conduct

the Government Performance and Results Modernization Act (GPRAMA) review, which could be the subject of a separate telecon. Dr. Kozyra noted that the GPRAMA process has changed, and for that reason she advised doing it separately.

Dr. Randall explained that some academics were still uncertain what their schedules would be in the fall, as their universities were still grappling with how to handle classes. It was agreed to wait about a month before polling the HPAC members about a time for the next meeting. There would be other individuals necessary at both the telecon and the next meeting, and they would need to be consulted as well. Dr. Kozyra said she would send an explanation of the new GPRAMA procedures to the HPAC members.

Adjourn

The meeting was adjourned at 4:13 p.m.

Appendix A Participants

Heliophysics Advisory Committee Members

Michael W. Liemohn, University of Michigan, *Chair*
Janet Kozyra, NASA Headquarters, *Executive Secretary*
Vassilis Angelopoulos, UCLA
Rebecca Bishop, Aerospace Corporation
Paul Cassak, West Virginia University
Darko Filipi, BizTek International, LLC
Lindsay Glesener, University of Minnesota
Larisa Goncharenko, MIT Haystack Observatory
George Ho, Applied Physics Lab
Lynn Kistler, University of New Hampshire
James Klimchuk, NASA Goddard Space Flight Center
Tomoko Matsuo, University of Colorado at Boulder
William H. Matthaeus, University of Delaware
Mari Paz Miralles, Smithsonian Astrophysical Observatory
Cora Randall, University of Colorado at Boulder

Other Participants

Bonnie Anderson
Ralph Beatty
Robert Becker
Adriana Bezos
Sky Bischoff-Mattson
Darcia Brown
Brooke Burns
Chris Caisse
David Cheney
Stephen Clark
Ian Cohen
Monte DiBiasi
Tammy Dickenson
Nicole Duncan
Jamie Favors
James Florance
Jeff Foust
Galen Fowler
Nicola Fox, *Heliophysics Division Director*
Heather Futrell
Lika Guhathakurta
Don Hadler
Roshanak Hakimzadeh
Samantha Haurie
Dawn Hessiler
Willis Jenkins
Jason Kalirai
Ben Kallen
Jennifer Kearns

Mona Kessel
Patrick Koehn
Jared Leisner
James Lochner
Margaret Luce
Ashton Lum
Jacqueline Mackall
Amy Marshall
Alicia Mendoza-Hill
Slava Merkin
Gene Mikulka
Jeff Morrill
Daniel Moses
Romina Nikoukar
Eliana Perlmutter
Kate Peterson
Simon Plunkett
Arik Posner
David Proulx
Leonardo Regoli
Kara Roberts
Alvin Robles
Juan Rodriguez
Andrew Rowe
Washito Sasamoto
Elizabeth Sheley
Howard Smith
Joe Smith
James Spann
Thomas Tomazi
Nathan Trail
Walter Twetten
Ekaterina Verner
Joseph Westlake
Ashley Wilkins
Chauncy Woo
Lisa Wood
Kaylen Woods
Eftyhia Zesta
Alan Zide

Appendix B Advisory Committee Membership

Michael W. Liemohn, Chair
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Janet Kozyra (Executive Secretary)
NASA Headquarters

Dr. Vassilis Angelopoulos
UCLA

Rebecca Bishop
Aerospace Corporation

Paul Cassak
West Virginia University

Darko Filipi
BizTek International LLC

Lindsay Glesener
University of Minnesota

Larisa Goncharenko
MIT Haystack Observatory

George Ho
Applied Physics Lab

Lynn Kistler
University of New Hampshire

James Klimchuk
NASA Goddard Space Flight Center

Tomoko Matsuo
University of Colorado at Boulder

William H. Matthaeus
University of Delaware

Mari Paz Miralles
Harvard-Smithsonian Center for Astrophysics

Cora Randall
University of Colorado at Boulder

Appendix C Presentations

1. *Heliophysics Division News, Updates, and New Initiatives*, Nicola Fox
2. *Space Weather Strategy, Space Weather Council, Instrumentation RFI*, James Spann
3. *Decadal Planning Activities*, Jared Leisner
4. *Rideshare*, Aly Mendoza-Hill
5. *DRIVE SCs Update*, Janet Kozyra
6. *GDC Update*, Jared Leisner

Appendix D Agenda

Heliophysics Advisory Committee (HPAC) Meeting

Virtual Meeting

June 30 – July 1, 2020

Tuesday June 30, 11:00 AM – 5:00 PM

11:00	Welcome	Dr. Janet Kozyra, NASA
11:05	Overview of Agenda	Dr. Michael Liemohn, Chair
11:15	Heliophysics Division News, Updates, and New Initiatives	Dr. Nicola Fox, NASA
12:20	Space Weather Strategy, Space Weather Council, Instrumentation RFI	Dr. James Spann, NASA
1:20	BREAK	
2:20	Decadal Midterm Responses	Dr. Michael Liemohn, Chair
3:20	Decadal Planning Activities	Dr. Jared Leisner, NASA
4:20	HPAC Work Session	
5:00	ADJOURN	

Wednesday July 1, 11:00 AM – 4:00 PM

11:00	Introduction	Dr. Janet Kozyra, NASA
11:05	Overview of Agenda	Dr. Michael Liemohn, Chair
11:15	Rideshare	Aly Mendoza-Hill, NASA
12:00	DRIVE SCs Update	Dr. Janet Kozyra, NASA
12:30	GDC Update	Dr. Jared Leisner, NASA
1:00	Public Comments	
1:10	BREAK	
2:10	HPAC Work Session	
3:30	HPAC Report out to HPD Director	
4:00	ADJOURN	