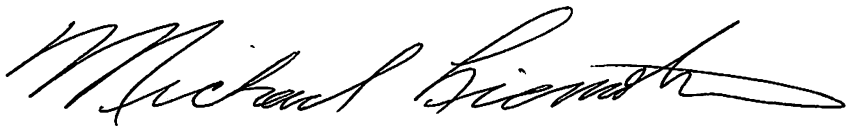
NASA ADVISORY COUNCIL

HELIOPHYSICS ADVISORY COMMITTEE

September 21, 2020

Teleconference

MEETING MINUTES



Michael Liemohn, Chair

Janet Kozyra, Executive Secretary

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Monday, September 21, 2020

Welcome

Dr. Janet Kozyra, Executive Secretary for NASA's Heliophysics Advisory Committee (HPAC), opened the meeting. HPAC is a Federal Advisory Committee Act (FACA) committee, and therefore minutes were being taken and there would be a public comment period.

Overview of Agenda

Dr. Michael Liemohn, HPAC Chair, welcomed the members and took roll. The purpose of this virtual meeting was to conduct the annual Government Performance and Results Act Modernization Act (GPRAMA) performance evaluation. This year, NASA's Science Mission Directorate (SMD) made some changes in how the review is done, so in addition to HPAC members, Dr. Marshall Shepherd of the Earth Science Advisory Committee (ESAC) and Dr. Conor Nixon of the Planetary Science Advisory Committee (PAC) were participating.

Welcome Remarks

Dr. Nicola Fox, Director of NASA's Heliophysics Division (HPD), thanked the meeting participants, noting that this would be the last meeting for Mr. Darko Filipi and Drs. Vassilis Angelopoulos, Lynn Kistler, George Ho, and William H. Matthaeus, whose terms on HPAC were ending.

Remarks about the New GPRAMA Performance Goal Structure

Dr. Michael New, NASA SMD Deputy Associate Administrator for Research, explained that every year, SMD identifies its science performance goals. Since SMD is encouraging more inter-divisional work, the reviews will now reflect that. More specifically, for each of the nine science goals, one division will lead the review and designated divisions will provide input. The SMD science performance goals with primary and secondary review responsibilities are in Table 1, below.

Table 1

PERFORMANCE GOALS	APAC	ESAC	HPAC	PAC
1.1.1 NASA shall demonstrate progress in exploring and advancing understanding of the physical processes and connections of the Sun, space, and planetary environments throughout the Solar System.		●	●	●
1.1.2 NASA shall demonstrate progress in exploring and probing the origin, evolution, and destiny of the galaxies, stars, and planets that make up the Universe.	●		●	●
1.1.3 NASA shall demonstrate progress in exploring, observing, and understanding objects in the Solar System in order to understand how they formed, operate, interact, and evolve.			●	●
1.1.4 NASA shall demonstrate progress in discovering and studying planets around other stars.	●		●	●

1.1.5	NASA shall demonstrate progress in improving understanding of the origin and evolution of life on Earth to guide the search for life elsewhere, exploring and finding locations where life could have existed or could exist today, and exploring whether planets around other stars could harbor life.	●		●	●
1.1.6	NASA shall demonstrate progress in developing the capability to detect and knowledge to predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth.			●	
1.1.7	NASA shall demonstrate progress in identifying, characterizing, and predicting objects in the Solar System that pose threats to Earth or offer resources for human exploration.				●
1.1.8	NASA shall demonstrate progress in characterizing the behavior of the Earth system, including its various components and the naturally-occurring and human-induced forcings that act upon it.		●		
1.1.9	NASA shall demonstrate progress in enhancing understanding of the interacting processes that control the behavior of the Earth system, and in utilizing the enhanced knowledge to improve predictive capability.		●		

HPAC was to lead the evaluation on two of the nine goals: 1.1.1, which addresses exploration and study of physical processes and connections related to the Sun; and 1.1.6, which is the science of space weather. Dr. New added that as this is a new construct for the GPRAMA evaluations, it will probably evolve further.

Dr. Tomoko Matsuo asked about the extent to which the wording of the performance goals was set, and whether HPAC might change anything. Dr. Liemohn said that HPAC could work with the source materials sent to the members by HPD. Dr. Matthaeus thought that 1.1.8 fit into the heliophysics charge. Dr. New said that there will be some reassessments for the next year.

GPRAMA Process

Ms. Jennifer Kearns of SMD provided background on GPRAMA, which requires each Federal entity to provide a strategic plan, an annual performance plan, and an annual performance report to evaluate progress made in key areas. In SMD, the performance measures address milestones for missions and development. There are also measures of science progress, the nine performance goals discussed by Dr. New, which call for review by external experts. In the case of heliophysics, HPAC conducts that review, which is a very high-level assessment based on achievements during the last year. The goal is to obtain a rating and provide some supporting material. Ms. Kearns noted that HPAC should stay with the wording of the performance goals as presented.

Any accomplishments cited in the supporting material should represent growth, and HPAC should also note any disappointments. The time period under consideration does not follow the fiscal year precisely, but rather covers the time since the previous review, which in this case would go back to HPAC's meeting of November, 2019. Any accomplishments considered must result in whole or in part from a NASA-funded activity. That funding did not need to come from HPD specifically. Dr. Kozyra had sent the members a document with items that they could consider, though they were not restricted to using those examples. The only requirement was that the HPAC material be sufficient to back the conclusions.

Key to the GPRAMA evaluations are the color ratings, which have not changed since last year:

- GREEN: Expectations for the research program fully met or exceeded in the context of resources invested.
- YELLOW: Some notable or significant shortfalls in context of resources invested, but some worthy scientific advancements achieved.
- RED: Major disappointments or shortfalls in the context of resources invested, uncompensated by other unusually positive results.

Ratings other than Green needed to have a clear rationale in the text. A NASA team will synthesize HPAC's examples for the final report.

Work Session on GPRAMA PG 1.1.1

Dr. Liemohn explained that he had arranged subgroups to do a first reading and draft for each of the two performance goals. Dr. Paul Cassak led the team that evaluated Performance Goal 1.1.1. That team included Drs. Larisa Goncharenko, Lindsay Glesener, Bill Matthaeus, and Lynn Kistler.

The initial draft included the following examples:

- Global scale Observations of the Limb and Disk (GOLD) enabled researchers to suggest a physical pathway for planetary coupling in the atmosphere-ionosphere system via planetary wave modulated tides. Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (TIMED) mission data from the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument showed that vertical temperature scales are an important signature of climate change, and Aeronomy of Ice in the Mesosphere (AIM) identified a previously unknown Sun-Earth connection having to do with mesospheric gravity waves.
- Data from the Van Allen Probes show that human activity can cause charged particles to be ejected from the radiation belts.
- The Magnetospheric Multiscale (MMS) mission, in conjunction with Japan's Arase mission, showed that oxygen ions flowing out of the aurora can be the source for ions that cause strong disturbances in Earth's magnetosphere.
- While the Parker Solar Probe (PSP) is still in route to the Sun, it has provided information on corotation and magnetic fields.
- The Mars Atmosphere and Volatile Evolution (MAVEN) mission has shown that ions lost from the Martian moon, Phobos, escaped from the atmosphere of Mars itself.

In discussion, it was noted that Dr. Shepherd contributed to the first example, and the MAVEN example came from Planetary.

[Dr. Shepherd had to leave the meeting. Dr. Liemohn asked him for his color rating, which was Green.]

The question of whether and how to represent all the different heliophysics regions came up, including if not all, how many? Dr. Goncharenko reminded HPAC that the important thing was to show progress. Dr. Matthaeus said he was fine with not covering all the subregions, and Dr. Liemohn said that while it is good to cover a spread, it is not part of the charge to cover them all. They agreed to leave it.

After further wordsmithing, HPAC voted in chat, with Dr. Liemohn calling for votes to be simultaneous so that there was no inadvertent influencing of others. The vote was unanimous to give Performance Goal 1.1.1 a rating of Green.

Work Session on GPRAMA PG 1.1.6

Dr. Kozyra noted that no other advisory committees were involved in review of this performance goal.

Dr. Bishop shared her screen and Dr. Matsuo read the draft.

One issue was that this performance goal had a subgoal: "To include specific consideration of progress in advancing scientific understanding of background solar wind, solar wind structures, and coronal mass ejections, which can be integrated into key models used to predict the arrival time and impact of space storms at Earth." Dr. Kozyra said that she understood it to be part of the overall assessment; it did not require a second vote. The members then discussed where to address it in the response, finally placing a statement at the end, to the effect that the Committee commended the outstanding progress made in understanding and forecasting solar events that affect the solar wind structure and drive extreme events.

The initial draft also included the following examples:

- Hinode and the Solar Dynamics Observatory (SDO) helped provide strong evidence for the onset mechanisms of flares.
- Interface Region Imaging Spectrograph (IRIS) observations and a Deep Neural Network have allowed researchers to better identify pre-flare spectra.
- The heliospheric fleet, particularly the Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission and the Geostationary Operational Environmental Satellite Program (GOES), has enabled new insights into the release of energy during intense geomagnetic storms.

The vote was done in chat again, and was unanimous to give Performance Goal 1.1.6 a rating of Green.

Space Weather Council (SWC) Discussion
Dr. James Spann explained that, as part of NASA's role in the National Space Weather Strategy and Action Plan, the Agency wants to have a group providing advice. The structure will be a Space Weather Council (SWC) as a subcommittee to HPAC. This was discussed at the last HPAC meeting, and NASA has since put out an open call to the community for self-nominations, receiving 132. It would be helpful for HPAC to identify any desirable characteristics and diversity axes for the composition of the Council, including areas to cover, representation of various groups, etc. The chair will be a member of HPAC, there will be 12 members, the findings and recommendations will go to HPAC, and HPAC will forward those to NASA as it sees fit. This will be a FACA committee.

Public Comments
The meeting provided an opportunity for public comment, but no one came forward.

Open Discussion
HPAC resumed discussing the SWC. Dr. Spann explained that SWC members will be appointed for 3-year terms, with one third of the members rotating off each year. Dr. Liemohn said that it will be similar to the Geospace Dynamics Constellation (GDC) Science and Technology Definition Team (STDT), which was required to give comments to HPAC and have the Committee approve its report. Dr. Spann added that not all of the meetings would be fully open.

Dr. Cassak asked if any of the nominations were from industry or end users. Dr. Spann said that while he did not know everyone on the list, he did not recognize any insurance or airline people. However, there were commercial sector nominations, mostly from the technology area. There were also some Federal civil service nominees from the Department of Defense (DOD), National Oceanic and Atmospheric Administration (NOAA), and NASA. The Agency wants to have experts in space weather who can provide advice back to NASA, rather than people seeking information. Dr. Bishop said that she would recommend having people familiar with DOD and the Department of Energy (DOE). Dr. Spann explained

that there is no requirement to stay within the list of self-nominees. If there is a missing aspect of diversity, NASA has leeway to ensure that the Council is fully representative of the space weather community. It is more important to ensure they have the right mix than to stay within this list.

Dr. Matsuo wondered about space weather research outside of SMD, and Dr. Spann said that if there is an area not covered by heliophysics, he would want to interface with them. While human spaceflight and the impact of radiation on biological tissues is outside the HPD realm, understanding the radiation environment is of value. As the biological and physical sciences identify energy ranges that affect spaceflight, HPD will want to focus there in order to provide that information to those who need it. Dr. Ho observed that the SWC will support HPD, which can then support other NASA divisions. Dr. Spann agreed, the SWC supports HPD first. Dr. Glesener advised having a couple of early career people on the Council. Dr. Cora Randall asked if there might be a need for expertise in education, broader impact, or communicating to the public. Dr. Spann said that these are areas space weather touches. There will be 12 members to cover a lot of aspects important to the discipline. Space weather is the applied expression of heliophysics.

Regarding international representation, that would be difficult because of FACA guidelines regarding citizenship. Dr. Liemohn asked if the call for nominations went to the user community or just the usual space researchers. Dr. Spann said they tried to be broad, and gave the example of NOAA email distribution lists. Dr. Randall was concerned about the amount of disinformation and the need to ensure that the research is communicated properly. Dr. Matthaeus agreed, giving the example of how little the space grant community at large knows about heliophysics. Dr. Spann found that interesting. The applied aspect will generate a lot of interest in some university and public settings that do not follow space physics. Dr. Matthaeus said that that will be good for pulling in underrepresented groups as well. Dr. Ho observed that space weather is the public phase of heliophysics. Open public meetings would be useful, as would participation by SMD communications people.

HPAC Report Out to HPD Director

Dr. Liemohn again thanked the departing HPAC members for their service. He then read the HPAC letter to Dr. Fox. For GPRAMA, the Committee gave Green ratings to both performance goals; the votes were unanimous. HPAC will be providing detailed write-ups. The Committee then heard from Dr. Spann about the status of the SWC.

Dr. Fox thanked HPAC. She had been listening in as her schedule allowed, and appreciated the work and the materials HPAC developed. She also appreciated the input on the SWC. Dr. Liemohn noted that two of the five HPAC members who are rotating off had been assigned to represent the Committee for the Astrophysics and Planetary GPRAMA reviews. He asked for volunteers to replace them, since their terms are up. He hopes to have the next meeting by the end of the year.

Adjourn

The meeting was adjourned at 5:02 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
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

Others
Chris Caisse
Amy Chaput
Tepkio Chelsey
Holly Degan
Elizabeth Esther
Nicola Fox, *Heliophysics Division Director*
Heather Futrell
Lika Guhathakurta
Hashima Hasan
Jeffrey Hayes
Ben Kallen
Jennifer Kearns
Mona Kessel
Margaret Luce
Amy Marshall
Scott Miller
Jeff Morrill
Michael New
Conor Nixon
Kate Peterson
Simon Plunkett
Arik Posner
Richard Rogers
Elizabeth Sheley
Marshall Shepherd
David Smith
James Spann
Megan Thompson
Steve Thompson
Lucia Tsaoussi
Walter Twetten

Appendix B
Advisory Committee Membership

Michael W. Liemohn, Chair
University of Michigan

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
Agenda

Monday, September 21 1:00pm – 5:00pm		
1:00	Overview of Agenda	Dr. Michael Liemohn, Chair
1:10	Welcome Remarks	Dr. Nicola Fox, NASA
1:15	Remarks about the new GPRAMA Performance Goal Structure	Dr. Michael New, NASA
1:25	GPRAMA Process	Jennifer Kearns, NASA
1:40	Work session on GPRAMA PG 1.1.1	
2:50	BREAK	
3:10	Work session on GPRAMA PG 1.1.6	
4:20	Public Comments	
4:25	Open Discussion	Dr. Michael Liemohn, Chair
4:45	HPAC Report out to HPD Director	
5:00	ADJOURN	