NASA EARTH SCIENCE ADVISORY COMMITTEE

TELECONFERENCE

NASA Headquarters

MEETING REPORT

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Marshall Shepherd, Chair

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Lucia Tsaoussi, Executive Secretary

Prepared by Jill Hacker

Ingenicomm, Inc.

Proceedings

In this teleconference, the Earth Science Advisory Committee (ESAC) reviewed the performance of NASA's Earth Science Program. Dr. Lucia Tsaoussi, ESAC Executive Secretary, had provided ESAC members with a report summarizing the program's performance.

Dr. Tsaoussi called the meeting to order about 1:40, once the people who had called in to the conference call could hear and be heard by the rest of the participants.

Participants in the room and on the telephone introduced themselves. See appendix A

Dr. Tsaoussi explained that this was the first meeting for some new members; she thanked them for joining. She explained that this telecon is done every year to fulfill the requirement for the program to have its performance evaluated. The review is a high-level assessment of science performance. Dr. Tsaoussi had provided a draft report to show committee members the program's accomplishments over the past fiscal year. Committee members are free to use any information they have, not just the report, in their evaluation.

Dr. Tsaoussi reviewed the scoring system, which had been explained in her email to members. A rating of green for a project means the project is fully meeting expectations; yellow means there are some major shortfalls; and red means there are a number of major problems. Dr. Tsaoussi turned the meeting over to the committee's chair, Dr. Marshall Shepherd, who was connected by telephone.

Dr. Shepherd thanked participants for joining and welcomed the new members. Dr. Shepard noted that the full membership is shown on the ESAC website (https://science.nasa.gov/researchers/nac/science-advisory-committees/esac).

Dr. Shepherd explained that there would be a discussion of each of the six Earth Science focus areas. At the end of each area's discussion, he would call for the committee's rating: green, yellow, or red, as explained above. The first program area to be discussed was Earth's surface and interior. Dr. Shepherd asked Dr. Roland Burgmann and Dr. Thomas Herring to lead the discussion.

Focus area: ***Demonstrate planned progress in characterizing the dynamics of Earth's surface and interior, improving the capability to assess and respond to natural hazards and extreme events.***

Dr. Burgmann welcomed the new members.

Dr. Burgmann explained that the focus of the Earth Surface and Interior (ESI) program is the whole Earth, with special attention to surface and interior processes, including their interaction with climatic processes. A new report last year defined the challenges, laying out research and observational programs. He said there has been progress on all questions in terms of new published studies and data sets being developed. He said the year had been successful and he had no critical comments.

Dr. Herring welcomed the new members. He agreed with Dr. Burgmann that the program looked strong. He said this year's report is more explicit than those of previous years in recognizing human impacts: fracking, groundwater, and wastewater disposal. With the new observing capabilities, every new earthquake brings new insights. He cautioned that in the NISAR mission, there has been so much growth in the magnitude of the data products that there is concern about the impact of that growth on data system. Generally, Dr. Herring said, the program is progressing well. Geodetic systems are being built perhaps more slowly than expected but still progressing. Collaboration with other countries is going well.

Dr. Shepherd invited questions. There were none.

It was agreed that the lead evaluator or evaluators of each focus area would offer their ratings and the rest of the committee could respond. For this focus area, Dr. Herring and Dr. Burgmann recommended a rating of green. No one disagreed.

Next, Dr. Shepherd moved the discussion to Atmospheric composition. Dr. Gregory Carmichael and Dr. Daven Henze led the discussion. Dr. Andrew Dessler was not able to join.

Focus area: ***Demonstrate planned progress in advancing the understanding of changes in Earth's radiation blance, air quality, and the ozone layer that result from changes in atmospheric composition.***

Dr. Carmichael said the atmospheric composition program is strong. He said the draft report is well formatted and nicely organized and that it shows the breadth and quality of the program. He said the draft contains great examples highlighting key issues such as climate change and atmospheric chemistry and that the translation of science to relevance to society is nicely captured. All around he said the effort was excellent.

Dr. Henze said he was impressed with the work from aerosols to air quality, as well as the description of airborne activities. Particularly, the integration of science results is nicely tied together with reliance upon remote sensing data. He suggested that members of the applied science community should be made aware of what is going to be made available. He said he was happy with the results.

Dr. Shepherd asked if Dr. Carmichael and Dr. Henze were comfortable with a green rating. Both said they were. Dr. Shepherd asked for comments from other participants. There were none.

Dr. Shepherd turned to the climate focus area. The discussion would be led by Dr. Richard Rood, Dr. Ian Joughin, and Dr. Ray Schmitt, with possible input from Dr. Ginny Catania and Natassa Romanou.

Focus area: ***Demonstrate planned progress in improving the ability to predict climate changes by better understanding the roles and interactions of the ocean, atmosphere, land, and ice in the climate system.***

Dr. Rood said that of the three or four such evaluations he has done, this document and summary were the best. He said all the missions seemed reported quite well; he was especially impressed with the references. He found the improvements going on in the cloud to participate more fully in CMIP to be a good thing. The GEOS system development and related modeling activity are more organized and strategic than in the past. These programs, he said, seemed to be getting more surface data into their assimilation, a central part of their mission.

Dr. Schmitt said he was impressed with the report's quality. He said the Hydrology and Ocean Interaction section makes some nice points. The Soil Moisture Active Passive (SMAP) mission is providing good salinity data; the report could have said more about that. Generally, the report covered the material well. He was happy to give the program a rating of green.

Dr. Shepherd agreed that the work was well done and he commended all the program managers for it.

Dr. Joughlin agreed that the work reported in this focus area looks good. For his field, the cryosphere, many missions are ending, making this time "the calm before the storm," when people are waiting to take advantage of data sets. He voted green.

Dr. Catania asked who had written the report that was sent out to the committee. Dr. Tsaoussi replied that the report was put together by NASA Headquarters program managers, based on input from members of the research programs including principal investigators (PI), as well as people at NASA centers reviewing literature. The choices about which projects to include were made by NASA HQ managers. Some informal telecons with a parent committee had served to plan and outline the content of the report.

Dr. Catania commented that the reported does not mention the high-mountain Asia project. Dr. Shepherd welcomed her to make her views known if she felt that something that is not represented should be. He noted that not every project can be mentioned, but if a project is high level enough, it should be flagged. Dr. Tsaoussi said she thought the high-mountain Asia project was mentioned in the report; she would check. Dr. Joughin commented that the project may not have resulted in publications yet. Dr. Tsaoussi explained that NASA does look for published results in choosing projects. Dr. Shepherd said the project should get covered once it results in publications.

Dr. Carmichael commented that he thought the advancements in GEOS-5 modeling system and in data simulation system are impressive. He has seen some important applications.

Dr. Shepherd asked if anyone was not comfortable with a green rating. No one expressed any objection.

Dr. Tsaoussi commented that the report under discussion was a draft. Before the report is published, NASA looks to the committee to make changes. The report represents the thinking of the advisory committee and will be posted on the ESAC website. Dr. Tsaoussi asked the committee to let the program know if something else should be included.

The next focus area to be discussed was weather. Dr. Christian Kummerow, who was out of the country and could not participate, had sent informal input to Dr. Shepherd praising the section and its authors and saying the program was at green status.

Focus area: ***Demonstrate planned progress in improving the capability to predict weather and extreme weather events***.

Ongoing activities continue to explore the connection between extreme weather and climate. Many efforts continue to improve the synthesis and integration of data both on global and regional scales. All around, Dr. Shepherd thought the report was very well done and he recommended a green rating.

Dr. Sara Tucker noted a difference between sections: The weather section was focused more on missions, less on science results than was the atmospheric composition section. She suggested adding to this section some information on how the data have improved forecasts. This section, she said, does summarize a great deal of important work. Regarding Dr. Tucker's comments about the different "personalities" of the report, Dr. Shepard said all the sections do not need to look exactly the same, but there should be some consistency.

Dr. Shepherd encouraged committee members to contribute comments in all areas of the program, not only in their areas of expertise. He asked for feedback about the weather section. Dr. Rood noted a statement in the report about the maturing of precipitation science and the development of new research topics, and he asked whether there is a plan to maintain continuity during the transition, specifically for observations that are important to forecasting. He warned that "maturing" means moving from research to monitoring and that could mean a gap. He suggested that for GEOS 5, if the National Oceanic and Atmospheric Administration (NOAA) continues to evolve its prediction system, it might consider moving algorithms over to observational side. He was delighted to see use of resources that Dr. Randall Dole at NOAA had put together. Dr. Rood also talked about connections between sections. For example, the weather program has a high priority on week 3 and week 4 forecasting and the climate predictability section cites a paper (DelSole) about week 3 and 4 forecasting. Discussion is needed about what is weather and what is climate, and about the science bridging the two.

Dr. Shepherd agreed, saying the 3- to 4-week forecasting time frame is going to be critical and the dots between weather and climate do need to be connected. A related critical area is attribution of extreme weather and climate.

Dr. Michael Freilich said, with respect to Dr. Rood's suggestion about monitoring and follow-on missions, that the program is looking forward to the Decadal Survey, which is due at the end of the calendar year. Regarding the transfer of knowledge from NASA research to NOAA, he asked whether for these sorts of transfers the Joint Center is inadequate or not well used. Dr. Rood responded that the Joint Data Assimilation Center seems to be in transition, with new leadership. Its move toward project-based management was a strong move in the right direction.

Dr. Shepherd and Dr. Rood said they were comfortable with a green rating.

Dr. Anne Nolin began the discussion of the water cycle focus by welcoming the committee's new members.

Focus area: ***Demonstrate planned progress in enabling better assessment and management of water quality and quantity to accurately predict how the global water cycle evolves in response to climate change***.

Dr. Nolin approved of the report's format, especially in the section on the water cycle. She suggested that the subsections be ordered in the same sequence as the overarching questions. For the subsection on global precipitation, evaporation, and the cycling of water, she suggested including results from the Global Precipitation Measurement (GPM) project. In water quality, she suggested adding consideration of water temperature, noting that there are total maximum daily loads (TMDL) for temperature for some watersheds with endangered fish species. Dr. Nolin recommended a green rating.

Dr. Shepherd asked for comments.

Dr. Ying Fan Reinfelder said she was impressed by the breadth and depth of the science, and by the opportunity for research afforded by NASA's observing capability and provided data. She said she was happy to give a green rating. She pointed out that NASA's data is used extensively, yet this report does not mention NASA's impact around the world. She suggested listing the places where NASA products are used. Dr. Shepherd agreed that NASA Earth science program impact is undervalued.

Dr. Jasmeet Judge said the soil moisture component, the part with which she was most familiar, captured SMAP's recent work well.

Dr. Shepherd asked the reviewers of the water focus section if they were all comfortable with a green rating. Everyone was.

Dr. Rood suggested that work associated with atmospheric rivers should also get some mention. Dr. Shepherd replied that the field of atmospheric rivers is emerging as an important area in meteorology and NASA's datasets on the topic are important and should be elevated; he agreed that atmospheric rivers should be included.

Dr. Tucker noted the connections among the focus areas; she suggested a table listing the NASA missions and how they tie in to each focus area, because the connections don't come across from the separate sections. Dr. Tsaoussi replied that this report is not meant to cover all of the program's science. Dr. Freilich commented that the main objective of this report is for ESAC to assess the value of the research element; still, a table or two demonstrating overlap between the thematic areas and the NASA missions would be worthwhile.

Dr. Colleen Mouw began the discussion of the carbon cycle focus area.

Focus area: ***Demonstrate planned progress in detecting and predicting changes in Earth's ecological and chemical cycles, including land cover biodiversity, and the global carbon cycle.***

Dr. Nancy Glenn had suggestions about linking the subsections together to make the report flow better and possibly adding a discussion of the role of drylands. That issue is discussed in another section, but the connection should be made. She said the section on urban ecosystems and the section on biodiversity workshop collaborative activities look great.

Dr. Lucy Hutyra felt the section on the carbon cycle read well, but there was confusion between the atmospheric composition section and carbon cycle section. She suggested linking the two sections more clearly. She also suggested including a discussion of the carbon monitoring system, as well as the international and interagency collaboration that NASA has been spearheading. The urban focus area, she said, is well done but narrow, focused exclusively around urban heat islands. She suggested a green light for the focus area.

Dr. Rood agreed that the results about OCO_2 and atmospheric carbon dioxide seemed important. He suggested that the revised document include a table noting the projects that cross focus area lines and are relevant to goals in more than one area. Dr. Tsaoussi replied that the program tries not to repeat information between sections, but can point out that something is relevant to more than one area. Dr. Kathy Hibbard said the papers discussed in the carbon cycle and ecosystems focus area do highlight program areas represented at the meeting, and there are cross-linkages that can be included in the report. Dr. Freilich suggested a short appendix on the results of the five OCO_2 papers that brings out the integration across thematic focus areas. Dr. Hibbard said Annmarie Eldering's paper has a short summary of all five papers that could be useful for this purpose. In other words, Dr. Freilich said, Dr. Elderry had done integration and synthesis work that could be used in a revision of the program summary report.

Dr. Shepherd asked if anyone disagreed on a green rating for this focus area. No one did. Dr. Shepherd said the meeting's review of the focus areas was complete. Once ESAC had the pending revisions and the appendix that had been proposed, he, as ESAC chair, would draft a letter stating ESAC's assessment. Dr. Tsaoussi confirmed that that was the procedure.

Dr. Tsaoussi invited committee members to send her comments on the report. Dr. Shepherd proposed a deadline of the following Wednesday, November 1, for comments. Dr. Tsaoussi agreed to it.

Dr. Tsaoussi thanked all participants. An in-person ESAC meeting was tentatively planned for around end of January, when the Decadal Survey was expected to be out. Dr. Tsaoussi would schedule it within the next several weeks.

Dr. Shepherd announced that at the upcoming American Geophysical Union (AGU) meeting in December Dr. Jack Kaye will be leading a section that will celebrate aspects of Earth sciences and contributions of Earth observations from space. Dr. Tsaoussi said an email about the meeting had gone out to the full committee. Dr. Shepherd said he would forward to the committee a summary that Dr. Kaye had provided.

Dr. Shepherd asked ESAC members to send their comments to Dr. Tsaoussi and he would send a letter summarizing ESAC's position. He thanked everyone for participating.

The conference call ended at 3 pm.

Dr. Freilich thanked everyone in the meeting room for their hard work on the document, which he said was great. He thanked Dr. Tsaoussi for coordinating so well.

Appendix A: Attendees

Connected by telephone

The members, on speaker, introduced themselves:

Dr. Marshall Shepherd
Dr. Roland Burgmann
Dr. Gregory Carmichael
Dr. Nancy Glenn
Dr. Daven Henze
Dr. Thomas Herring
Dr. Lucy Hutyra
Dr. Colleen Mouw
Dr. Anne Nolin
Dr. Ying Fan Reinfelder
Dr. Richard Rood
Dr. Ray Schmitt
Dr. Sara Tucker

In the conference room
Dr. Michael Freilich
Dr. Jack Kay
Dr. Lucia Tsaoussi, Executive Secretary

Appendix B: Membership Roster
From https://science.nasa.gov/researchers/nac/science-advisory-committees/esac

Dr. Marshall Shepherd, chair - University of Georgia

Dr. Roland Burgmann - University of California, Berkeley

Dr. Ginny Catania - University of Texas at Austin

Dr. Gregory Carmichael - The University of Iowa

Dr. Andrew Dessler - Texas A&M University

Dr. Nancy Glenn - Boise State University

Dr. Kathleen Green - Kass Green & Associates

Dr. Daven Henze - University of Colorado

Dr. Thomas Herring - Massachusetts Institute of Technology

Dr. Lucy Hutyra - Boston University

Dr. Ian Joughin - Applied Physics Laboratory

Dr. Jasmeet Judge - University of Florida

Dr. Christian Kummerow - Colorado State University

Dr. Colleen Mouw - University of Rhode Island

Dr. Anne Nolin - Oregon State University

Dr. Ying Fan Reinfelder - Rutgers University

Dr. Richard Rood - University of Michigan

Dr. Anastasia Romanou - Columbia University

Dr. Ray Schmitt - Woods Hole Oceanographic Institution

Dr. Sara Tucker - Ball Aerospace & Technologies Corp.