

# NASA ADVISORY COUNCIL

## Earth Science Advisory Committee

November 14, 2019

Teleconference

### MEETING MINUTES

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J. Marshall Shepherd, Chair

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Lucia S. Tsaoussi, Executive Secretary

Thursday, November 14, 2019

#### Opening Remarks/Meeting Introduction

Dr. Lucia Tsaoussi, Executive Secretary of the Earth Science Advisory Committee (ESAC), explained that the ESAC had gone from 20 members to 14, and would be going down to the designated size of 10. Dr. Tsaoussi noted that this telecon was a Federal Advisory Committee Act (FACA) meeting, which was open to the public. Minutes were being taken and will be posted online.

The purpose of the telecon was to discuss the Government Performance and Results Act (GPRA) Modernization Act (GPRAMA) ratings. NASA's Earth Science Division (ESD) had generated some background documents, which the members updated. There were six focus areas, which ESAC would discuss prior to providing a rating for each. The Science Mission Directorate (SMD) criteria for GPRAMA voting are as follows:

- Green – Expectations for the research program fully met in context of resources invested.
- Yellow – Some notable or significant shortfalls, but some worthy scientific advancements achieved.
- Red – Major disappointments or shortfalls in scientific outcomes, uncompensated by other unusually positive results.

#### GPRAMA Discussion

Dr. Marshall Shepherd opened the discussion by asking the ESAC members to present their conclusions on their designated Focus Area write-ups.

The Climate Variability and Change focus area research seeks to describe, understand, and predict the ways in which Earth's ocean, atmosphere, land, and ice interact and influence Earth's climate over a wide range of time scales, in order to better predict changes in the Earth's climate from sub-seasonal to multi-decadal time scales.

Overall, the draft received good feedback. Dr. Joughin noted the need for some small edits, and Dr. Tsaoussi explained that ESAC members would have an opportunity to edit and wordsmith. Dr. Joughin was also concerned that ice was split between the cryo part and the Earth system modelling, which was fine, but it might be a good idea to note the split. Dr. Ray Schmitt said that this is the best GPRAMA write-up he has seen, but it did seem somewhat disjointed to have ice here and in the modeling section.

Dr. Anastasia Romanou agreed that the draft was a very nice and thorough overview of recent publications, well-done and clearly written despite minor spelling issues. Her concern is that there are unclear categorizations, like ice sheet processes, which is a completely separate section from the ice sheet and supra- and subglacial water. She wondered if there might be a programmatic reason for the split. Regardless, she felt that global glacial change should be a different section. Also, some of the work on ocean atmosphere interruptions affecting precipitation rate over land, should be merged with ice sheet coupling. However, the piece was very well done overall.

Dr. Shepherd moved that ESAC approve a recommendation of Green for this focus area. All members on the call concurred for a unanimous vote.

ESAC discussed the Carbon Cycle and Ecosystems focus area next. This focus area supports research to improve understanding of the cycling of carbon in reservoirs and ecosystems as it changes naturally, is changed by humans, and is affected by climate change.

Dr. Lucy Hutyra thought it was a good, comprehensive report. In the first section, the first paragraph opens with a statement about the release of the second State of Carbon Cycle Science report. That is true but it is neither mentioned again nor described in more detail. She also found font and typo issues. Otherwise it was very well harmonized. Dr. Nancy Glenn agreed. She asked if they should mention the Ice, Cloud, and Land Elevation Satellite-2 (ICESat-2) from a vegetation perspective, noting that there has been some nice work on that. Dr. Tsaoussi asked that she add a few sentences or a reference in her edit. Dr. Glenn also noted that there was no mention of the ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) mission in this report, and she would like a couple of sentences about it. Dr. Tsaoussi said that there are not yet any publications on it, though ESD can look at it. Dr. Woody Turner confirmed that it is a little early on the publication side. There have been some press releases but not much else. Dr. Glenn thought they might be able to mention ECOSTRESS in the sentence about the ICESat launch. She had a few minor edits as well. Dr. Colleen Mouw thought the piece was well-compiled. Dr. Romanou observed that the carbon cycle is also mentioned elsewhere.

Dr. Shepherd asked about the timeframe being covered. Dr. Tsaoussi explained that it is officially Fiscal Year 2019 (FY19), which would cover Oct. 1, 2018, to Sept. 30, 2019. However, this is not exact, in that GPRAMA sometimes does not capture the precise dates of the fiscal year, and there is some grey area. It is important to not overlap results from one year to the next, and she gave the example of reporting the same publication twice.

As there were no more comments on this section, Dr. Shepherd recommended a Green rating, which the members confirmed.

The next focus area, Weather and Atmospheric Dynamics, seeks to improve understanding of the fundamental processes that drive weather. This focus area supports research to obtain measurements of the atmosphere that help improve weather predictions from the local through global scales. The focus area helps improve knowledge of the fundamental processes that drive these systems and inform the operational infrastructure upon which other federal agencies rely.

Dr. Shepherd thought it was a well-written section, though he noted that all of the acronyms needed to be spelled out. He also disagreed with including lightning under “extreme events.” Dr. Sara Tucker agreed that it was a good draft and thought the report does a good job of showing data from missions that are hitting their stride and producing great results. It would be good to add a line about how NASA Global Modeling and Assimilation Office (GMAO) is working on wind optimization. In addition, the Cyclone Global Navigation Satellite System (CYGNSS) is getting great data and interesting science after overcoming some initial obstacles. Otherwise, she had just a few wordsmithing and typo issues that she would submit.

Dr. Shepherd asked if there were any objections to a recommendation of Green. As there were none, that was the assigned rating.

Through the Atmospheric Composition focus area, NASA conducts research on the composition of Earth’s atmosphere, including its chemical and physical properties, energy budget, and air quality. This research improves society’s ability to predict how future changes in atmospheric composition will affect climate, weather, and air quality.

Dr. Andrew Dessler thought the draft was impressive. He noted that among the four key areas covered was aerosols and cloud radiative effects. The field is far from closure on the problem, which is a big part of the Aerosol and Cloud, Convection, and Precipitation (ACCP) observing systems project. Air quality research has been one of NASA’s high points. He was pleased to see the connection to human impact and how people react to it. There is great progress on air pollution, and sections on greenhouse gases and

highlights from Orbiting Carbon Observatory -2 (OCO-2). Finally, there is good discussion of the upper atmosphere and ozone depletion. He likes the observation that China still produces F11 and F12, which shows how good the treaty is. There were some suborbital activities that were very successful. He was very impressed.

Dr. Daven Henze said it was very clear. One section that focused on air quality over south Korea was duplicated further on. Regarding airborne activities, he did not see anything on fire air quality. Dr. Barry Lefer agreed to add a few sentences on it, and thanked Dr. Henze for catching the disconnect on the Korea-United States Air Quality (KORUS-AQ). Dr. Henze added that the air quality overview section highlights the pending value of the Tropospheric Emissions: Monitoring Pollution (TEMPO) mission. Given our air quality concerns and the data from TEMPO, it would be worthwhile to clarify the impact on premature deaths. It was agreed that this is easy to fix.

Dr. Shepherd held the vote, and the Committee agreed on a rating of Green.

The Water and Energy Cycle focus area studies the distribution, transport, and transformation of water and energy within the Earth system. Research includes defining global precipitation, reducing the uncertainties of estimates of water and energy budget terms, and having a strong focus on improving remote sensing techniques for land water stores and fluxes.

Dr. Ying Fan Reinfelder said that the section was quite comprehensive, and she is amazed at how much is going on. The piece had a good structure on water cycle dynamics. It is good to highlight the cross-cutting components as ESD did. It was also noteworthy that they pulled used high-profile journals to highlight achievements. She wondered if there is a cross-division report that can highlight the most exciting achievements of the year. There is a lot of press addressing space science, but she felt that the public does not hear much about ESD. That could be addressed by highlighting the cross-divisional areas. Dr. Shepherd agreed. Dr. Tsaoussi said that there are AGU sessions and other such groups that highlight this work and report out on it. NASA reports through a number of different venues. It was noted that NASA had previously selected the top 10 research accomplishments and could do something similar again. However, that is separate. The GPRAMA report has a structure that separates activities by division, but NASA does not want to stovepipe otherwise.

Dr. Jasmeet Judge liked that the report highlighted synergies between different missions, showing that the missions work better in combination. She made some edits. She agreed that the acronyms all need to be spelled out, but it was well written and she loved reading the highlights. She recommended a Green rating, as did Dr. Reinfelder.

Dr. Shepherd took the vote on the rating, and all members agreed on Green.

The Earth Surface and Interior focus area supports research and analysis of solid-Earth processes and properties from crust to core. This includes providing the space geodetic observations and products foundational to many space missions.

Dr. Thomas Herring thought the summary presented a nice blending of space assets to evaluate solid-Earth activities and characteristics. There has been some good cross-fertilization, and progress has been good. Regarding the Space Geodesy Project (SGP), it would be nice if it went faster, but it is moving. He would vote for Green. It was noted that the SGP launch date is January, 2022, but some slippage is likely. Dr. Roland Burgmann said he agreed with Dr. Herring's thoughts. He really liked the balance among the components and the progress shown, and the presentation was accessible. Things are looking good for the future, as there are data from various types of platforms and different types of measurements. These come together to build the basis for some exciting science.

Dr. Shepherd asked if ESAC recommended a Green rating; all members agreed.

Dr. Tsaoussi said that they had concluded this year's assessment. She asked that members with edits or comments please make them in the file or send them to her. The finalized document will go on the website.

The next in-person meeting is in February, 2020, and she would send a poll to select dates, will focus on the update to the Decadal Survey. She asked that members send any ideas for agenda items to her via email. If you have ideas for agenda, please email her. Dr. Schmitt asked that she please avoid the February Ocean Science meeting, February 17-21.

Adjourn

The meeting was adjourned at 4:19 p.m.

***ESAC Members***

Marshall Shepherd; Chair - University of Georgia  
Roland Burgmann - University of California, Berkeley  
Andrew Dessler - Texas A&M University  
Thomas Herring - Massachusetts Institute of Technology  
Ian Joughin - Applied Physics Laboratory  
Ray Schmitt - Woods Hole Oceanographic Institution  
Anastasia Romanou - Columbia University  
Colleen Mouw - University of Rhode Island  
Daven Henze - University of Colorado  
Jasmeet Judge - University of Florida  
Lucy Hutyra - Boston University  
Nancy Glenn - Boise State University  
Sara Tucker - Ball Aerospace & Technologies Corp.  
Ying Fan Reinfelder - Rutgers University