National Aeronautics and Space Administration

Earth Science Subcommittee of the NASA Advisory Council

October 10, 2012

TELECONFERENCE MEETING MINUTES

Lucia Tsaoussi
Executive Secretary

Byron Tapley
Chair

Submitted:
Carolyn Cook, Consultant
PB Frankel, LLC

The teleconference commenced October 10, 2012, at 12:30 p.m. Dr. Lucia Tsaoussi, Executive Director of the Earth Science Subcommittee (ESS), began the session by asking participants to identify themselves. She welcomed Dr. S. Prasad Gogineni, the newest Subcommittee member. Dr. Tsaoussi noted that the ESS has not met since March 2012. She advised that this is a FACA meeting, advertised in the Federal Register and open to the public.

Dr. Tsaoussi affirmed that the major item of business is to discuss summaries of the performance of the Earth Science Division (ESD) in its assigned task areas. She noted that the results of today's teleconference will be posted online. Dr. Michael Freilich, ESD Director, stated that he understands the goals of today's teleconference to be that the ESS will review and rate each of the six annual performance objectives, assign a color (green, yellow or red), vote and reach consensus, and document the ratings.

In response to a question, Dr. Tsaoussi explained that the appendices are provided as background material to give members a better understanding of the performance of the objectives that they are rating. The appendix material does not go forward; however, Dr. Tsaoussi advised members that if they find something significant in the appendices that they believe should be emphasized, they can bring it forward. She further explained that the Subcommittee is responsible only for performance evaluation and color coding. The implications of the color ratings are the concern of ESD.

Dr. Tapley began the discussions by noting that a lead has been assigned to each objective for capture and compilation of comments and edits. He noted, however, that all Subcommittee members should participate in the discussions and the ratings.

The name of the lead is listed with each objective. Discussion results are presented in the order of discussion.

Objective 2.1.2: Progress in enabling improved predictive capability for weather and extreme weather events. (Dr. Patrick McCormick is the lead with assistance from Dr. John Christy, Dr. Marshal Sheppard, and Dr. Patrick Jenkins).

The discussion began with agreement that this is a good program. The theoretical and interesting satellite information is being processed and transferred to the operational side, and the operational side has used some of these products. The information from the instruments is a perfect use of NASA instrumentation for things people care about in terms of extreme weather.

Dr. Jenkins suggested including more comments about the airborne programs and the Hurricane and Severe Storm Sentinel (HS3) program. Dr. McCormick agreed that overall, the write-up is good, although he would like to see more about the preliminary data. He also noted that nothing is mentioned in this section about the Atmospheric Infrared Sounder (AIRS) boundary layer work, or CloudSat and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO).

Dr. Sheppard emphasized the increasing importance of ensemble prediction systems (EPS) classification for tropical cyclones, noting ongoing discussions about shortcomings and how tropical storms are classified especially in light of Isaac's significant hydro-meteorological impact.

A comment was made about how this relates to progress in enabling improved predictive capability, and a suggestion was made that this might belong in a different section. Dr. Sheppard acknowledged that this information could belong somewhere else, noting that the ability to classify storms or identify where storms are is a significant result. He also asked if this might be the place to add a mention that the National Oceanic and Atmospheric Administration (NOAA), the Hurricane Center, and Department of Defense (DOD) partners continue to use data from the Tropical Rainfall Measuring System (TRMM) as part of their real-time hurricane diagnostics and predictive support. We have evidence that the data in this section is directly being utilized by stakeholders. Dr. Tapley agreed there are a number of users of this data, and the science is important; thus, it would be good to mention even though it might not be used as an evaluator. Dr. Foufoula-Georgiou asked if the phrase "and the resulting hazards" should be added to the last sentence of this section on page 5.

Dr. Mahta Moghaddam suggested including a comment about the impact of soil moisture on prediction in this section. Dr. Tapley agreed that while soil moisture is discussed in one of the other sections, it is not as prevalent in this section. On that point, Dr. Tsaoussi explained that a lot of discussion on observant capabilities was not included because of the Subcommittee's task to rate the performance of the research programs for the last year and not milestones or the flight program performance. She added that since ESS owns this report, and members are free to offer edits if desired.

Members were directed to send comments or edits to Dr. McCormick for compilation. A 'green' rating was assigned to objective 2.1.2.

Objective 2.1.5: Progress in understanding the roles of ocean, atmosphere, land, and ice in the climate system and improving predictive capability for future evolution. (Dr. William Large has the lead assisted by Dr. David Siegel).

Dr. Large began the discussion by stating that the objective of improving predictive capability is difficult to demonstrate. He described the phrase *predicted minimum* in the second sentence of paragraph 3 on page 11 as inadequate, saying it is too vague and unclear about the point at which the predictions begin. After a brief discussion, the members agreed that *predictive minimum* would be changed to *anticipated minimum.* It was also noted that the Greenland Melt section on Page 11 is under-reported somewhat diminished the multiple contributions of NASA satellites. The major story about this science was the demonstrated consistency of results from various NASA platforms. This should be emphasized more.

Dr. Bernard Minster stated that more emphasis should be placed on the NASA-initiated Sea-level Response to Ice Sheet Evolution (SeaRISE) project and NASA's ability to categorize the models, something that only NASA can do, in paragraph 1 on page 12. It's also important to note that NASA took the first step in the Ice Sheet System Model (ISSM) exercise.

Dr. John Christy suggested that the write-up on the Modern Era Retrospective Analysis for Research and Applications (MERRA) is over-optimistic and should be toned down given there is still work to be done; however, it should be mentioned that we expect MERRA to continue to improve. After additional discussion on this point it was decided that the word *very* in line 8, paragraph 2 on page 12 should be removed. It was also suggested that something should be added to the Coupled Model Inter-comparison Project (CMIP) section about NASA's advanced understanding of the roles of the oceans.

Members were directed to send comments or edits to Dr. Large for compilation and redistribution. A 'green' rating was assigned to Objective 2.1.5.

Objective 2.1.4: Progress in quantifying the key reservoirs and fluxes in the global water cycle and assessing water cycle change and water quality. (Anna Michalak has the lead assisted by Efi Foufoula-Georgiou).

Overall, it was decided that this section is disproportionately short and superficial compared to the other sections. Specific results or outcomes are missing. Information on drought monitoring, Aquarius, and Soil Moisture Active Passive (SMAP) algorithm development is missing. A comment was made about the importance of showcasing the strengths of drought monitoring, with a suggestion to add that there are groups at the Jet Propulsion Laboratory (JPL) and Goddard Space Flight Center (GSFC) doing a lot of satellite-driven drought analyses. It was also suggested that the information about the NASA Energy and Water cycle study's (NEWS) compilation of the "first-ever satellite-based energy and water cycle climatology…" could be strengthened.

Dr. Anna Michalak commented that the finding in Section 2.1.3 with reference to *net reduction in the surface area of water in lakes across Canada* might fit better in Section 2.1.4. In response to a question on the writing process, Dr. Tsaoussi explained that different people write the sections with contributions from a variety of sources. The appendices provide more details and science results. Dr. Freilich said that any help ESS could provide in strengthening this section would be appreciated.

Dr. Michalak commented that last year she remembered similar conversations about how to balance various sections. She asked whether specific guidelines might be provided to section authors in the future to simplify the

reconciling process. Dr. Tsaoussi responded that guidelines are currently provided to the authors but unfortunately, they are not always read or interpreted consistently. Dr. Tsaoussi offered to share these guidelines with Dr. Michalak to see if she might be able to clarify them.

Dr. Tapley commented that he is intrigued by the sentence on shorter-term remote sensing data sets at the bottom of the last paragraph on page 9. He asked if any conclusions had been drawn from this study, indicating that he would very much like to read the report. Dr. Tsaoussi advised that she will try to find the report in the appendix for him.

In response to another question, Dr. Tsaoussi confirmed that this is an ESS report; the rationale for the ESS performance ratings is part of ESS' records. Congressional reports are formatted differently and much shorter. She added that this document will be viewed as the ESS evaluation of the program. That being the case, Dr. Tapley recommended a more proactive approach to the edit and suggested a re-draft. Dr. Tsaoussi requested a quick turnaround (within the next few days) if possible.

Members were directed to send comments or edits to Dr. Foufoula-Georgiou. A 'green' rating was assigned to Objective 2.1.4.

Objective 2.1.6: Progress in characterizing the dynamics of Earth's surface and interior and forming the scientific basis for the assessment and mitigation of natural hazards and response to rare and extreme events. (Dr. Bernard Minster has the lead assisted by Dr. Mark Simons).

Dr. Minster began the discussion by stating that overall, he is pleased with this section. He highlighted the critical nature of the Space Geodesy Project with anything having to do with global science, adding that modern society cannot live without it. The information on TriG, Natural Hazards Program Element, and modeling and analysis is well-stated.

Dr. Tapley opined that the prediction of tsunamis by looking at the ionospheric gravity waves is extremely interesting. He noted that the timelines on some deliverables raise questions about next year's report. Specifically, the timeline for an August 2013 delivery of a prototype geodetic observatory may be something to look at next year as a performance index.

Dr. Moghaddam noted a small contrast between this section and the others. She stated that there is a lot of discussion in 2.1.6 about observation capabilities compared to the other sections that report more science results. She asked if this section should be modified to be more consistent. Dr. Tapley concurred that this section is inconsistent with the others. He noted that while there are some science results, 2.1.6 predominantly talks about measurement capabilities. Dr. Minster emphasized that the measures discussed in 2.1.6 are absolutely essential to programs discussed in the other sections, adding that none of the other science could be done without the infrastructure being established in the Earth Surface and Interior Focus Area (ESI). Dr. Tapley responded that in terms of capabilities while critically important, this is a science discussion and an anomaly that still shows up in terms of presentation in this section compared to other sections. This section is focused on the science that has been done to reach each objective. He added in that context, we could talk about the data that is available and what is being done with it. Dr. Minster will draft changes with the focus on accomplishments. Dr. Moghaddam will provide a few sentences to Dr. Minster.

A 'green' rating was assigned to objective 2.1.6.

Objective 2.1.3: Progress in quantifying, understanding, and predicting changes in Earth's ecosystems and biogeochemical cycles, including the global carbon cycle, land cover, and biodiversity. (Dr. Steve Running has the lead assisted by Dr. Hank Shugart and Dr. Daniel Jacob).

Dr. Running began the discussion by stating that both the write-up and appendices provide a good balance of new activity in land cover and biogeochemical cycles, adding he does not see substantial omissions. Dr. Michalak opined that it might be worthwhile to include a sentence or two about the Orbiting Carbon Observatory (OCO-2) in the carbon cycle summary. Dr. Running suggested that the language on page 21 of the appendix might cover what she is looking for. Dr. Michalak agreed to provide a couple of sentences to Dr. Running.

Dr. Siegel agreed to the overall effectiveness of the write-up. He noted that the section about remote sensing with respect to the gulf oil spill is an important demonstration of NASA's responsiveness and recommended leaving it in the summary even though it really does not fit.

Dr. Minster asked if it might be worthwhile to include Airborne Unpiloted Aerial Vehicle Synthetic Aperture Radar (UAV/SAR) metrics at the bottom of Page 6 with the three-dimensional (3D) structure of vegetation and requirements for the Deformation, Ecosystem Structure, and Dynamics of Ice (DESDynI) mission information. It is something that could be emphasized. After further discussions, Dr. Tapley asked Dr. Minster to develop additional language for this section.

A 'green' rating was assigned to Objective 2.1.3, with the inclusion of the additional language from Drs. Minster and Michalak.

Objective 2.1.1: Progress in understanding and improving predictive capability for changes in the ozone layer, climate forcing, and air quality associated with changes in atmospheric composition. (Dr. Daniel Jacob has the lead assisted by Dr. Judith Curry).

Dr. Jacob began the discussion by stating that overall the write-up is very good. It effectively highlights the work that NASA scientists are doing on the Airborne Tropical Tropopause Experiment (ATTREX), Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE), and DISCOVER-AQ. It also has some exciting science about the major arctic depletion event that took place in the winter/spring, and data that is starting to come in from integration of information from different satellites in terms of understanding atmospheric composition. Dr. Jacob suggested that results from CARVE and the arctic ozone depletion should be added to the main body of the text. This information is presently in the appendix.

Dr. Tapley agreed that the section is excellent. He pointed out the last paragraph that mentions the number of publications available, suggesting something similar for each section would be good. He noted that with respect to the main objective, *progress in understanding and improving predictive capability*, the understanding portion is very strongly articulated, but improving predictive capabilities of models seems weak. The improvement over what the base is comes into question; for example, with regard to the prediction accomplishments for climatology processes such as deep convection and biomass burning. Dr. Tapley suggested that tying this down more completely would strengthen the write-up.

Dr. Richard Eckland, Program Manager with the Atmospheric Composition focus area, noted that there are research papers in the appendix that advance the predictive capability across a number of areas; these papers could be referenced. Dr. Tapley asked that this additional text and any other comments be sent to Dr. Jacob for compilation and redistribution. A 'green' rating was assigned to Objective 2.1.1.

At the conclusion of the teleconference, Dr. Tsaoussi asked the members to submit their comments promptly via email to the appropriate section leads with copies to her. Members should watch for Dr. Tsaoussi's reminder about the next meeting to be scheduled in the next couple of months.

The meeting was adjourned at 2:59 p.m.

Appendix A: NASA Advisory Council Earth Science Subcommittee

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APPENDIX B: October 10, 2012 Teleconference Participants

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Michael Freilich	NASA HQ/Earth Science Division
Efi Foufoula-Georgiou	University of Minnesota
Daniel Jacob	Harvard University
William Large	National Center for Atmospheric Research
Patrick McCormick	Hampton University
Anna Michalak	Carnegie Institution of Science
Bernard Minster	University of California, San Diego
Mahta Moghaddam	University of Michigan
Steven Running	University of Montana
David Siegel	University of California, Santa Barbara
Konrad Steffen	University of Colorado
John Christy	University of Alabama at Huntsville
S. Prasad Gogineni	University of Kansas
Gregory Jenkins	Howard University
Marshall Shepherd	University of Georgia
Richard Eckland	Atmospheric Composition Focus Group
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