Earth Science Subcommittee Report
March 20 and 21, 2010
NASA Headquarters

From: The NASA Earth Science Subcommittee – Byron Tapley (Chair), Daniel Jacob, Vice Chair, John Christy, Judith Curry, James Hansen, Raymond Hoff, Gregory Jenkins, William Large, Patrick McCormick, Anna Michalak, Jean-Bernard Minster, Steve Running, Robert Schutz, David A. Siegel ,Hank Shugart, Mark Simons, Konrad Steffen, Charles Vorosmarty

To: Wes Huntress (Chair, NAC Science Committee)

Cc: Jens Feeley (NAC Science Committee Executive Secretary), Michael Freilich (ESD Director), Peg Luce (ESD Deputy Director), Jack Kaye (ESD Associate Director for Research), Stephen Volz (ESD Associate Director for Flight Programs), Lawrence Friedl(Acting Associate Director for Applied Sciences), Lucia Tsaoussi (Earth Science Subcommittee Executive Secretary)

Dear Wes:

The Earth Science Subcommittee (ESS) met on March 16 and 17, 2010 at NASA Headquarters. A comprehensive briefing on the status of the ESD program, including the new climate initiative, as they was available at the time of the meeting was given by Michael Freilich. Steve Volz and Jack Kaye summarized the status of the Flight Program and the Research program respectively. Peg Luce provided the committee with a detailed briefing on the status of the NPOESS program, as it was understood at the time of the meeting. Greg Williams presented aspects of the SMD Science Plan.

In the following discussion, our summary recommendations and findings are presented in bold. **We request that you transmit to the NAC the attached recommendation on the Earth Science Subcommittee Interaction with the JPSS.**

In reviewing the details of the $2.4 Billion ESD budget augmentation for the years FY2011 through FY2015, as they were available at the meeting, we understand that that the Decadal Survey Tier 1 missions (CLARREO; SMAP, ICE Sat II, and DESDyNI) are in an active state of development and are targeted to be launched between 2014 and 2017. The complete plans for the Tier 2 and Tier 3 missions were still in embargo, pending convergence of discussions with OSTP and OMD. It was also reported that the foundational missions (OCO-2, Glory, Aquarius, NPP, LDCM, and GPM) and the Congressionally directed "national needs" missions (DSCOVR, SAGE-III and the TIR on LDSM) are fully funded within the base budget and the new climate initiative funds will not be used to fund any of these missions. The suite of foundational and national need missions is to be launched by 2013. *We commend ESD for placing a proper foundation in place for the decadal survey mission suite.*

It was reported that there is some activity in planning the Tier 2 missions, but no direct activity in implementing the Tier 3 missions. These missions involve Earth Science disciplines that may feel disengaged from ESD in the absence of planning efforts. Sustained activity in Tier 2 mission planning, and initial activity in Tier 3 mission planning, would cost

little and go a long way in keeping these communities engaged. **We recommend that ESD invest some resources in the planning of both Tier 2 and Tier 3 missions in order to keep the scientific community engaged, to better define the foci and requirements of these missions, and to seek opportunities through new technologies and international partnerships.**

This issue of continuity of the measurements established by a number of current missions is a concern of the ESS. The ICEBRIDGE program is addressing the ICESat Mission continuity, pending launch of ICESat-2. This program is using aircraft measurements in the Arctic and Antarctic to bridge the ice topography measurements between the two satellite missions. However, plans for other critical measurements are less well established. The Decadal Survey emphasized the importance of measurement continuity but did not address it in its plan, presuming that NPOESS would deliver (which has not happened). As noted above, ESD has a partial plan in place, whereby some critical climate measurements are bridged to planned missions and some measurements, e.g., radar altimetry is transitioned to other partners. **We recommend that ESD develop a list of measurements that are candidates for continuing and provide a briefing to the ESS on the plans for addressing this issue.**

Significant progress was reported in the use of aircraft measurement systems to complement the satellite measurements. UAV systems are being deployed in several planned measurement campaigns. The UAVSAR has been engaged in measurement campaigns in Central America, supporting archeological and tropical forest and vegetation studies. In an illustration of the versatility of such systems, it was reported that the UAVSAR, which was involved in the South American measurement campaign, was deployed to Haiti, in a rapid response mode, to make critical measurements of post earthquake rupture and existing faults. In an important step for atmospheric/ocean sciences investigations, NASA's unmanned Global Hawk vehicle was scheduled for its first flight at the end of March 2010, from Dryden Research Center to Hawaii to the North Pole and back, for purposes of satellite validation and detection of fragments of the polar gyre. Federal Aviation Agency (FAA) permission for operations in commercial airspace remains an ongoing issue. This capability provides a significant new ability to obtain under flight calibration data and to obtain critical rapid response measurements to support hazard management. The ESS will look to hear additional progress on this system at future meetings.

A topic of considerable interest for the ESS is the NPOESS program implementation. As previously reported, the measurements from this program are important to the foundations on which the NRC Decadal Study was predicated. The NPOESS program has been restructured and the civilian portion of it was renamed the Joint Polar Satellite System (JPSS). On February 1, 2010, the Administration distributed the responsibilities so that NOAA and NASA are responsible for the afternoon orbit and the Department of Defense (DOD) is responsible for the early morning orbit. The agencies will share all data. The mid-morning and afternoon orbits provide the measurements that are used for most Earth Science studies. The mid-morning measurements will be provided under an international agreement with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). Since the primary objectives of EUMETSAT are to provide weather related measurements, there is some concern that the accuracy and calibration of the EUMETSAT measurements will not satisfy the requirements for ESD studies. **We recommend that ESD work with EUMETSAT so that the instrument performance and measurement**

requirements will support determination of the Essential Climate variables necessary for climate studies.

Other concerns arise from the nature of the NASA/NOAA interactions. The ESS sees issues with the operational program also fulfilling the role of sustained science observations requirements (climate, etc.).

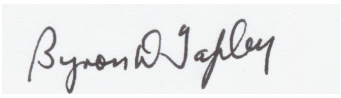
The committee is pleased with the progress to date, but a number of essential questions are unclear, such as: 1. Procedures and responsibilities for the Climate observation requirements, 2.The instrument performance and measurement specifications, and 3.How the requirements for the climate instruments would be verified and maintained

With these questions as a background, the ESS concerns about a procedure for interaction with JPSS, in regard to the ESD climate measurement requirements, leads to the following recommendation. **The ESS recommends that appropriate venues for the development of an integrated national Earth Observing strategy be identified as quickly as possible.**

The ESS has previously noted the importance international collaboration and its role in providing a complete set of the measurements for Earth System studies. The presentation by ESD summarized the active program of international collaboration.
Of the 13 currently operating satellites, 9 involve significant international collaboration. ESD is also collaborating with the Japan Aerospace Exploration Agency (JAXA) on three major new initiatives, the French agency CNES, the Brazilian space agency (INPE) and the German National Space Agency(DLR). While the bi-lateral collaborations have been recognized as highly important, there have been previous recommendations that NASA develop better relations with ESA. A major obstacle in this regard has been rooted in differences between ESA and NASA's data policy. An additional challenge lies in the fact that ESA is driven by a process that involves competition followed by an ESA reformulation while NASA's program emanates from a vision. However, with the comprehensive suite of measurements required to understand Earth System Dynamics, the importance of an integrated effort between the two agencies is of increasing importance. Current progress on the data issue suggests the possibilities of a significant step in the cooperation between the agencies. It is important that the opportunity be utilized.

Recommendation: Based on the importance of a complementary NASA/ESA Earth Science Program, ESS recommends that continuation of efforts to define a framework for collaboration be given a high priority in the international program development.
The next ESS meeting was planned for the first week in November 2010.

Sincerely,



The Earth Science Subcommittee

Byron Tapley, Chair

tapley@csr.utexas.edu

512-266-1713

APPENDIX 1: Proposed Recommendation for the NAC Science Committee

Subcommittee Name: Earth Science
Chair: Byron Tapley
Date of Public Deliberation: March 20-21, 2010
Date of Transmission: June 21, 2010

Short Title of Proposed Recommendation: **Earth Science Subcommittee Interaction with the JPSS**

Short Description of Proposed Recommendation:

The ESS enthusiastically supports the transition of the NPOESS program from the IPO to NASA procurement with the creation of the JPSS program. Even though it is unclear how NASA requirements will be accommodated by the future JPSS systems and how the resulting data products will be managed and distributed, we agree that this path is the best hope to retrieve quality science observations from these up-coming polar orbiting operational missions. This is particularly important for the Earth Science Division as the NPOESS preparatory mission, NPP, is a "foundational mission" in the present version of ESD's mission planning.

The ESS is concerned about potentially conflicting data product requirements between the operational needs of NOAA (as well as other agency partners) and the research needs of the NASA Earth Science Division. We propose that the ESS could provide a suitable body for regular review of the JPSS program.

Recommendation:

The ESS recommends that appropriate forums be established that will facilitate the development of an integrated observing space-based strategy for both research and operational National Satellite Systems.

Outline of the Consequences of No Action on the Proposed:

The opportunity to assess the availability and quality of critical climate measurements, assumed as a foundation for the Earth Science Program described in the NRC Decadal Survey, will not be achieved.