**Earth Science Subcommittee Report**
**April 11, 2013**
**Teleconference**

**From:** The NASA Earth Science Subcommittee Byron Tapley (Chair, NAC ESS), Daniel Jacob <djacob@fas.harvard.edu, Jean-Bernard Minster <jbminster@ucsd.edu>, Steve Running <swr@ntsg.umt.edu>, Pat McCormick <PAT.MCCORMICK@HAMPTONU.EDU>, Dave Siegel <davey@icess.ucsb.edu>, 'wily@ucar.edu' Large <wily@ucar.edu>, hhs@virginia.edu, Konrad Steffen <konrad.steffen@colorado.edu>, Efi Foufoula-Georgiou <efi@umn.edu>, Mahta Moghaddam <mmoghadd@eecs.umich.edu>, Anna M. Michalak <michalak@stanford.edu>, Kass Green <kassgreen@earthlink.net>, Prasad Gogineni <gogineni@cresis.ku.edu>, J. Marshall Shepherd marshgeo@gmail.com, Lucia S. (HQ-DK000) Tsaoussi <lucia.s.tsaoussi@nasa.gov>,(Executive Secretary)

**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 (Associate Director for Applied Sciences), Lucia Tsaoussi, ESS Executive Secretary.

Dear Wes:

The Earth Science Subcommittee (ESS) convened by telecom for a special meeting on April 11, 2013. Specific topics for the meeting included: 1) a brief review of the 2014 President's Budget, 2) a review of the status and issues related to the ESD input to the 2014 NASA Science plan and 3) a joint NAC Science/ IT Committee review of data systems for SMD missions, to determine what is best of breed. The budget status was described by Michael Freilich, ESD Director, the status and future development activities for the 2014 Science plan were presented by Dan Woods, SMD strategic integration and management Director, and the issues related to the IT Recommendation of Data System evolution were presented by Larry Smarr, NAC IT Committee Chair.

In the discussion of the 2014 Science Plan, the ESD specific Earth Science goals were framed in the context of using satellite-based measurements and the analysis of these measurements to advance knowledge of the earth as a system to meet the challenges of environmental change and to improve life on our planet. The set of goals implied by this objective was reviewed as it relates to the science plan and the impact that the set will have on the annual performance evaluation for 2014 and later years.

**Finding: The ESS finds that the Strategic Objectives and Science Goals, as presented, represent an appropriate set for developing the Earth Science components of the 2014 Science Plan. The objectives and goals provide an appropriate base for the planning future ESD Mission and Research Objectives and for the ESS to use as guidance in future performance evaluations**

The NAC IT committee presentation focused on improving the performance and efficiencies of the science components of the agency computing and data handling requirements. The presentation described the need for a data-intensive cyber

infrastructure for the NASA Science Division to support the evolving science discovery, and education and public outreach requirements of the agency. The presentation recognized the distributed nature of the ESD Science Data System and the importance of improving communication bandwidth to fully utilize the distributed data archives and computational modeling capabilities, which make up the ESD Science Data and Information System. Recent local area and national bandwidth communication advances were summarized.

The ESS recognized the transformational trends that are evolving in the computation, storage and communication areas and support studies to identify areas where the overall NASA capabilities could be improved. Some examples were identified where connection to NASA and other agency data archives have impacted the science data processing. The ESS recognizes the importance of the self-study/review proposed in the IT presentation. Given the distributed nature of the NASA ESD Science Data and Modeling systems, the ESS believes that the review should consider both the need to acquire, store, process and distribute large quantities of instrument data and the demands associated with creating higher order information products created by modeling and data assimilation. The review should consider also the advantages of improvements in the communication bandwidth between the distributed data system elements.

**Recommendation: The Earth Science Subcommittee recommends that NASA ESD conduct a self-study to compare the existing cyber infrastructure within the Science Mission Directorate with the best of breed. As a basis for any possible changes, the study should focus on areas where cyber infrastructure are, or soon will, limit science productivity, outreach to the public, or applied uses of NASA data, as well as areas where improvements will lead to identifiable research/ science gains.**

While supporting the self study effort, the ESS finds that the current data system is fulfilling the ESD objectives in a commendable manner and, while the merits of the study proposed are recognized and supported, the ESS notes that any changes to the current system should made be implemented in an evolutionary manner that does not impact the information flow to the current science and application user community. The background for this concern lies in the recognition that the ESD data and information management elements represent one of NASA's larger data archiving, distributing and computing activities. There are two major components of the overall program. The first relates to the processing, archiving and distribution of the large set of inhomogeneous data collected by the suite of national and international satellites, which is the responsibility of the Earth Observation Satellite Data and Information System (EOSDIS). The EOSDIS is an essential extension of the instruments on the orbiting satellite constellation, and is responsible for both instrument data and the higher-level products developed by combining various instrument measurements collected by both NASA and international satellites. The second significant component of the overall program involves the computing systems that satisfy the data and modeling requirements for the ESD Science and Applications program. Both the EOSDIS and the computing elements are implemented with a distributed processing and storage architecture. In addition, there is a large and diverse international user community involved in analyzing this data. The data system activities are fundamental to satisfying the requirements of both current and future NASA missions. The ESS recognizes the potential for the improvements envisioned in the proposed NAC IT Committee study.

However, any activities to improve the ESD data system must occur in a way that maintains the data system commitment for timely data product delivery.

**Finding: The current data system is satisfying the requirements of a diverse community of national and international users who are active in using the data and modeling products from a large suite of orbiting satellites. Any changes to this system should be made in a way that is consistent with the mission requirements, satisfies the scientific criteria for NASA data stewardship and satisfies the requirements of a broad user community.**

The next meeting of the ESS will be planned for July 2013.

Sincerely,

The Earth Science Subcommittee
Byron Tapley, Chair