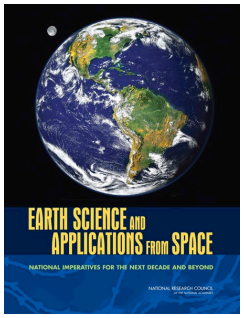


NRC Decadal Survey 2017 – 2027
And Potential Impacts for Big Data and Data Science the Earth Science IT Systems

Constantine Lukashin, NASA LaRC, Hampton, VA

IEEE Big Data, Geoscience, 2015

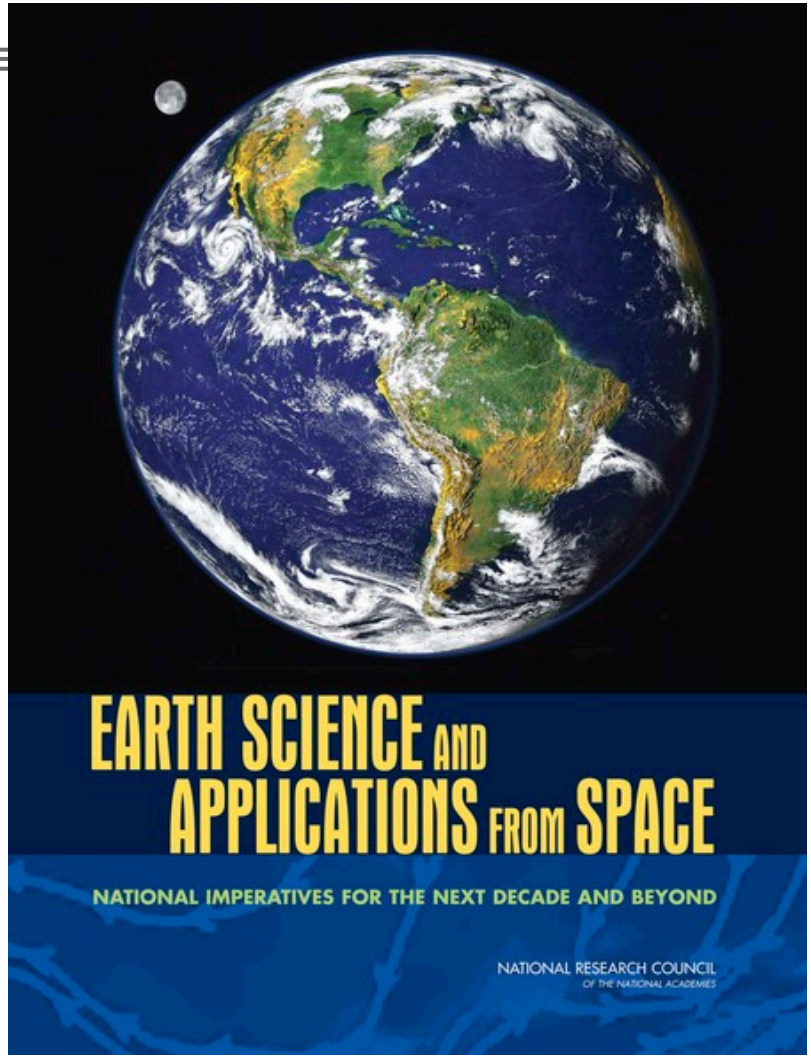
NRC Decadal Survey 2007

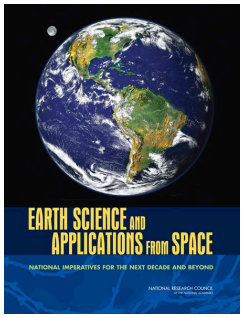
"Understanding the complex, changing planet on which we live, how it supports life, and how human activities affect its ability to do so in the future is one of the greatest intellectual challenges facing humanity. It is also one of the most important for society as it seeks to achieve prosperity and sustainability."

From the interim report of the inaugural National Research Council (NRC) Decadal Survey, Earth Science and Applications from Space. April 2005

INPUT: White Papers from science community

OUTPUT: Report with recommendations to th NASA, NOAA, and USGS





NRC Decadal Survey 2007

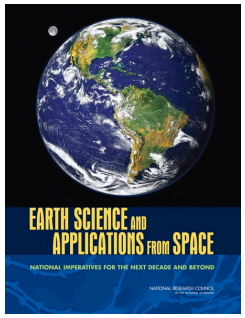
Recommendations for Earth Science and Applications from Space:

- Vision for the next decade and beyond;
- Science summaries, application and societal benefits;
- Strategy for implementation:
  14 missions for implementation by NASA;
  2 missions for implementation by NOAA (TSIS & CERES);
  1 mission (CLARREO) for implementation by NASA and NOAA.
- Mission scenarios and costs.
- Total: 437 pp.

2007 Decadal Survey's study panels:

1. Earth Science Applications and Societal Needs
2. Land-use Change, Ecosystem Dynamics, and Biodiversity
3. Weather (including chemical weather and space weather)
4. Climate Variability and Change
5. Water Resources and the Global Hydrologic Cycle
6. Human Health and Security
7. Solid-Earth Hazards, Resources, and Dynamics

NRC Decadal Survey 2007



2007 RFI was for missions (research or operations):

1. A summary of the mission concept, including the observational variable(s) to be measured, the characteristics of the measurement if known (accuracy, horizontal, vertical and temporal resolution), and domain of the Earth system (e.g. troposphere, upper-ocean, land surface).

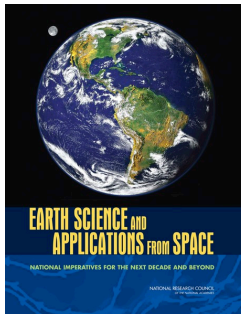
2. A description of how the proposed mission will help advance Earth science and/or applications, or provide a needed operational capability, for the next decade and beyond.

3. A rough estimate of the total cost (large, medium, or small) of the proposed mission over ten years. For operational missions the costs should include one-time costs associated with building the instrument and launch and ongoing operational costs.

4. A description of how the proposed mission meets one or more of the following criteria, which will be used to evaluate and prioritize the candidate proposals: (a) – (j) details

Page limit: 10 pages.

NRC Decadal Survey 2007



Recommendation for Earth information system (a few quotes):

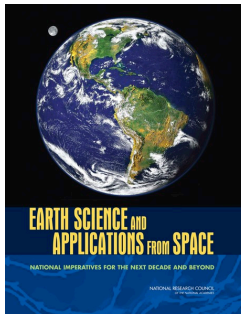
A formal interagency planning and review process should be put into place that focuses on effectively implementing the recommendations made in the present decadal survey report and sustaining and building the knowledge and information system for the next decade and beyond.

NOAA, working with the Climate Change Science Program and the international Group on Earth Observations, should create a climate data and information system to meet the challenge of ensuring the production, distribution, and stewardship of high-accuracy climate records from NPOESS and other relevant observational platforms.

Deriving Data from Multiple Observations and Sensors: In order to evolve the global observing system in a cost-effective way to meet broad scientific and societal objectives and to extract maximum useful information from multiple observations and/or sensors, teams of experts should be formed to focus on providing comprehensive data sets that combine measurements from multiple sensors

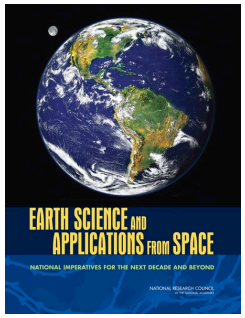
As new Earth observation missions are developed, there must also be early attention to developing the requisite data processing and distribution system, and data archive. Distribution of data should be free or at low cost to users, and provided in an easily accessible manner.

NRC Decadal Survey 2017



- Decadal Survey 2017 Charter includes the NASA, NOAA and USGS.
- NRC 2015 Report:
  "Continuity of NASA Earth Observations from Space: A Value Framework"
  will be heavily used. Available at http://www.nap.edu/21789
- The DS 2017 White Paper format is TBD !
- The White Paper request: early next year (?)
- Earth Science and Application IT aspects:
  consider as missions or key challenges !
- No input will results in no recommendations for aggressive actions.

NRC Decadal Survey 2017: Initial RFI



1. What are the key challenges or questions for Earth System Science across the spectrum of basic research, applied research, applications, and/or operations in the coming decade?

2. Why are these challenge/questions timely to address now especially with respect to readiness?

3. Why are space-based observations fundamental to addressing these challenges ?

In responses, focus on the role of space-based:

A. Whether existing and planned U.S. and international programs will provide the capabilities necessary to make substantial progress on the identified challenge and associated questions. If not, what additional investments are needed ?

B. How to link space-based observations with other observations to increase the value of data for addressing key scientific questions and societal needs;

C. The anticipated scientific and societal benefits.

D. The science communities that would be involved.

Page limit: 3 pages
Due date: November 2nd, 2015