Report on the NOAA Response to the National Research Council Decadal Survey

Excerpts from a Presentation by Mary Kicza
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to the NOAA Science Advisory Board

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Purpose

- Provide an information briefing on NOAA's response to recommendations in the National Academies of Science Decadal Survey of Earth Sciences and Applications from Space

Why Did NOAA and NASA Request this Study?

- In 2004, NOAA and NASA requested the science community's advice and guidance for:
  - A prioritized list of important Earth science measurements
  - Identify potential new space-based capabilities to support national needs
  - The 2005 – 2015 timeframe and beyond
  - NOAA's use in making observing system investments
  - NASA's use in generating research priorities

Decadal Survey: Two Phases

- Phase 1 – Main Decadal Survey Study from August 2004 to January 2007
  - Produced 12 main recommendations for NOAA and NASA*
  - The study's way forward was altered in mid-course in 2006 by
    - NPOESS Nunn-McCurdy restructuring
    - GOES-R series rescoping, including removal of the Hyperspectral Environmental Suite (HES)

- Phase 2 – Supplemental panel established in March 2007
  - Address impacts of NPOESS restructuring on climate sciences
  - Address the impact of GOES-R restructuring
  - Recommend mitigation strategies
  - Recommendations are due to NOAA in January 2008

* Report is available on the web (436 pages in .pdf format):
http://www.nap.edu/catalog/11820.html

Issues

Key issues highlighted by the Decadal Survey:

- Maintaining the U.S. Government's leadership in Earth observing systems and applications
- Addressing new space based systems for NOAA to transition to operations
- Defining NOAA's role in Earth science research, operations, and applications relative to that of NASA and other agencies of the U.S. government
- Partnering with NASA for future operational systems

Decadal Survey Recommendations: Five Categories

- A vision for the future
- Setting the foundation: Observations in the current decade
- New observations for the next decade
- Turning satellite observations into knowledge and information
- Sustaining the knowledge and information system

Approach for Producing the NOAA Response

- Guiding Principles:
  - Develop response in the context of the all observing systems and requirements across NOAA
  - Maintain consistency with parallel activities, including:
    - The NOAA-NASA Research to Operations Report to Congress
    - Examining options to remanifest NPOESS climate sensors, and associated climate science support
    - Analysis of Alternatives (AoA) for providing GOES-R HES capabilities
    - Ocean Surface Vector Winds Continuity Concept Studies
  - Coordinate response across NOAA councils, goals, and line offices

Decadal Survey Recommendations:
A Vision for the Future

- The U.S. government, working in concert with the private sector, academe, the public, and its international partners, should renew its investment in Earth observing systems and restore its leadership in Earth science and applications.

NOAA Response:
A Vision for the Future

- Continuing strong role for NOAA in developing the Global Earth Observing System of Systems (GEOSS)
- Leadership role in the U.S. Group on Earth Observations (USGEO)
  - Co-Chairing U.S. GEO
  - Supporting development of U.S. Earth observation policy
  - Co-chairing development of an Integrated Investment Strategy
- Within NOAA, developing Satellite Recapitalization Plan to guide future investments
- Increased emphasis on partnering opportunities:
  - NASA
  - International agencies

Decadal Survey Recommendations:

Setting the Foundation: Observations in the Current Decade

- NPOESS: NOAA should restore key climate, environmental, and weather capabilities to the NPOESS mission

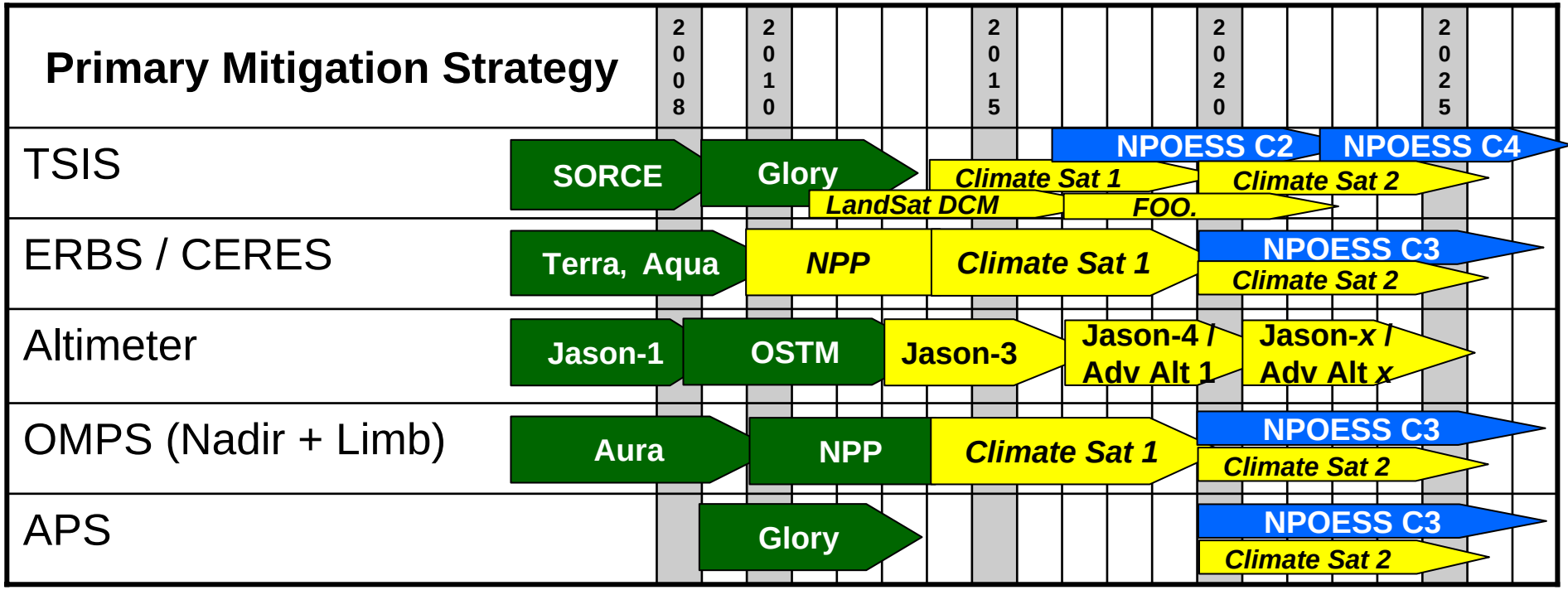
- GOES-R: NOAA, working with NASA, should restore the capability to make high-temporal and vertical-resolution measurements of temperature and water vapor on GOES-R

NOAA Response:

Setting the Foundation: Observations in the Current Decade

- NPOESS
  - Office of Science and Technology Policy (OSTP) requested NOAA and NASA examine:
    - Impacts and priorities for remanifesting climate sensors
    - Options and costs for remanifesting climate sensors
    - Impacts and priorities for remanifesting space weather sensors
- GOES-R
  - Analysis of alternatives for advanced geostationary sounding and coastal waters imaging
- National Research Council workshop on June 19-21, 2007; Report due late August
  - Analyze impact of recent changes to NPOESS and GOES-R
  - Develop a strategy to mitigate these impacts

Range of Options Examined for Climate Data Continuity



TSIS – Total Solar Irradiance Sensor

ERBS/CERES – Earth Radiation Budget Sensor

OMPS – Ozone Mapping and Profiler Suite

APS – Aerosol Polarimeter Suite

Current and Planned Missions
NASA-NOAA Mitigation Flight
NPOESS Mitigation Flight

Decadal Survey Recommendations:

New Observations for the Next Decade

- NOAA and NASA should undertake a set of 17 recommended missions, phased over the next decade
- NOAA should transition three research observations to operational missions in the 2010 to 2013 time frame:
  - Vector ocean winds
  - GPS radio occultation temperature, water vapor and electron density profiles
  - Total solar irradiance and Earth Radiation Characteristics
- NASA should implement a set of 15 missions in small, medium and large categories
- Develop technology in support of missions
  - NASA-invest in both mission-focused and cross-cutting technology development to decrease risk in missions and promote cost reduction across multiple missions
  - NOAA-increase investment in research to operations

NOAA Response:

New Observations for the Next Decade

- NOAA actions for the three recommended missions:
  - Solar and Earth radiation measurements:
    - Analyzed as integral part of climate sensor remanifesting options for OSTP
  - GPS occultation observations:
    - Providing ground station antennas for COSMIC data at Fairbanks and Tromso as in-kind contributions to continue current observational capability
    - Will develop long term solutions (FY10 and out) based on NWS requirements
  - Ocean Surface Vector Winds continuity
    - Initiated concept studies with JPL -- report due in early 2008
    - Preliminary cost estimated to be $400-500M, depending on configuration and type of instrument
- Ongoing Research to Operations discussions:
  - Re-instituted NOAA-NASA Roundtable and established NOAA-NASA Research-to-Application Joint Working Group
    - Developing approaches to implementing an operational satellite improvement project, with emphasis on instrument technologies
  - NOAA developed 5-year and 20-year Research Plan
    - NOAA has established a “Transition of Research to Application” policy and implementation procedures

Decadal Survey Recommendations:

Turning Satellite Observations into Knowledge and Information

- OSTP in collaboration with NOAA and other relevant agencies, should develop and implement a plan for achieving and sustaining global Earth observations
- NOAA, working with CCSP and GEO, should create a climate data and information system to ensure sustained production, distribution, and stewardship of high-accuracy climate records
- NOAA, NASA, and USGS should increase support to Earth systems modeling, including high performance computing and support for modeling and data assimilation

NOAA Response:

Turning Satellite Observations into Knowledge and Information

- US Group on Earth Observations developing US policy on Earth Observation and integrated Earth Observation investment strategy
- NOAA response to remanifesting NPOESS climate sensors emphasizes sustaining high-accuracy climate records
- NOAA is examining requirements, costs, and organizational implications to establish a National Climate Information Service

Decadal Survey Recommendations:

Sustaining the Knowledge and Information System

- A formal interagency planning and review process should be put into place that focuses on effectively implementing the committee recommendations to **sustain and build the knowledge and information system** for the next decade and beyond.

- NASA, NOAA, and USGS should pursue **innovative approaches to educate and train scientists and users of Earth observations and applications**. A particularly important role is to assist educators to inspire and train students in the use of Earth observations and the information derived from them.

NOAA Response:

Sustaining the Knowledge and Information System

- NOAA will support these recommendations as an integral part of efforts currently underway
  - Development of U.S. policy on Earth Observations
  - Development of an integrated Earth Observation investment strategy
  - Development of a National Climate Information Service

NOAA Coordination & Views

- NOAA Observing Systems Council (NOSC) coordinates with:
  - Other NOAA councils (NOAA Research Council, NOAA Ocean Council, etc.)
  - NOAA Goal Teams
  - NOAA policy organizations (e.g., PPI)
- Coordinating with NASA:
  - NOAA-NASA Roundtable
  - Research and Operations Working Group
- Scientific Community (National Research Council)
- International Partners (EUMETSAT, India, Japan, etc.)
- International organizations such as the Committee on Earth Observation Satellites (CEOS)
  - Climate and ocean disciplines


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Questions?

NRC Decadal Survey: Recommendations in 5 Categories

DS Rec #	DS Recommendation Short Title
A VISION FOR THE FUTURE	
1	**Renew Leadership & Investment**
1a	Renew Investment
1b	Restore Leadership
SETTING THE FOUNDATION: OBSERVATIONS IN THE CURRENT DECADE	
2a-c	**NPOESS Instruments**
2a1	NPOESS: Total Solar Radiation
2a2	NPOESS: Earth Radiation
2b1	NPOESS: Ocean Vector Winds (CMIS)
2b2	NPOESS: All-Wx SST (CMIS)
2c	NPOESS: Ozone Monitoring (OMPS Limb)
2d-f	**GOES-R**
2d	GOES-R High Res Profiles
2e	GOES-R GIFTs
2f	GOES-R Cost-effective Sounder
3	**NASA (GPM, Landsat-7, Land Cover Changes)**
3a	Launch GPM
3b	Replace Landsat-7
3c	Land Cover Change Info
NEW OBSERVATIONS FOR THE NEXT DECADE	
4	**17 Missions: (one joint with NASA)** **NOAA = Transition 3 research missions to operations** **NASA = 15 NEW**
4a1	NOAA, XOVWM: Transition to Operations
4a2	NOAA, GPSRO: Transition to Operations
4a3	NOAA, CLARREO: Transition to Operations
4b	NASA 15 new missions

DS Rec #	DS Recommendation Short Title
5	**NASA/NOAA Tech Development**
5a	NASA increase investment…
5b	NASA create low-cost research missions
5c	NOAA increase investment…
TURNING SATELLITE OBSERVATIONS INTO KNOWLEDGE AND INFORMATION	
6	**NASA: more than one-only mission for research**
7	**OSTP Agency Charters**
8	**Complimentary Observations**
8a	Complimentary obs (Human activities)
8b	Complimentary obs (Socioeconomic factors)
9	**Supporting Observations**
9a	Supporting obs (sub-orbital, airborne)
9b	Supporting obs (UAV)
10	**Data Processing, R&A, Modelling, …**
10a	Assimilation of data from multiple sensors
10b	NOAA: Create climate data & info system
10c	Develop data processing & distribution
10d	NASA Research and Analysis
10e	NASA, NOAA, USGS: Earth system modelling
SUSTAINING THE KNOWLEDGE AND INFORMATION SYSTEM	
11	**Interagency Planning (NOAA & NASA get together)**
12	**Education & Training**