



Earth Science and Applications

Climate in a Box Workshop

*Applied Sciences Program
Earth Science Division
NASA Headquarters*

22-March-2010

*Discovering and Demonstrating Innovative and
Practical Applications of Earth Science*



NASA and Earth Science

Earth Science Division

NASA is primarily a research and development agency.

The NASA Earth Science Division supports research on the Earth system and its processes. Primary efforts are to characterize, understand, and improve predictions of the Earth system.

In the course of performing its research, NASA collects observations and generates new scientific knowledge that can be applied to meet organizations' decision-making activities.

Technology

Missions

Research

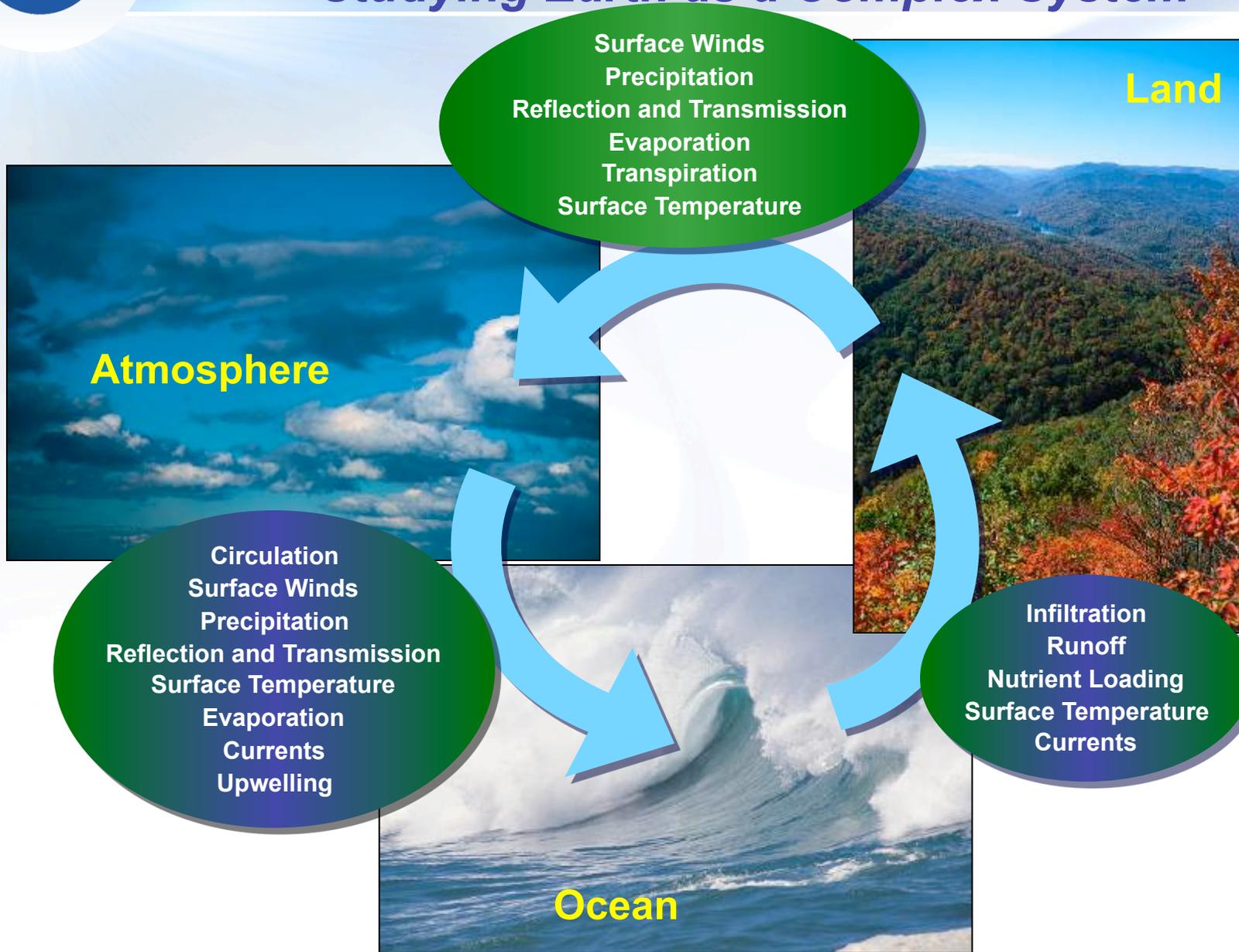
Data Systems

Applications

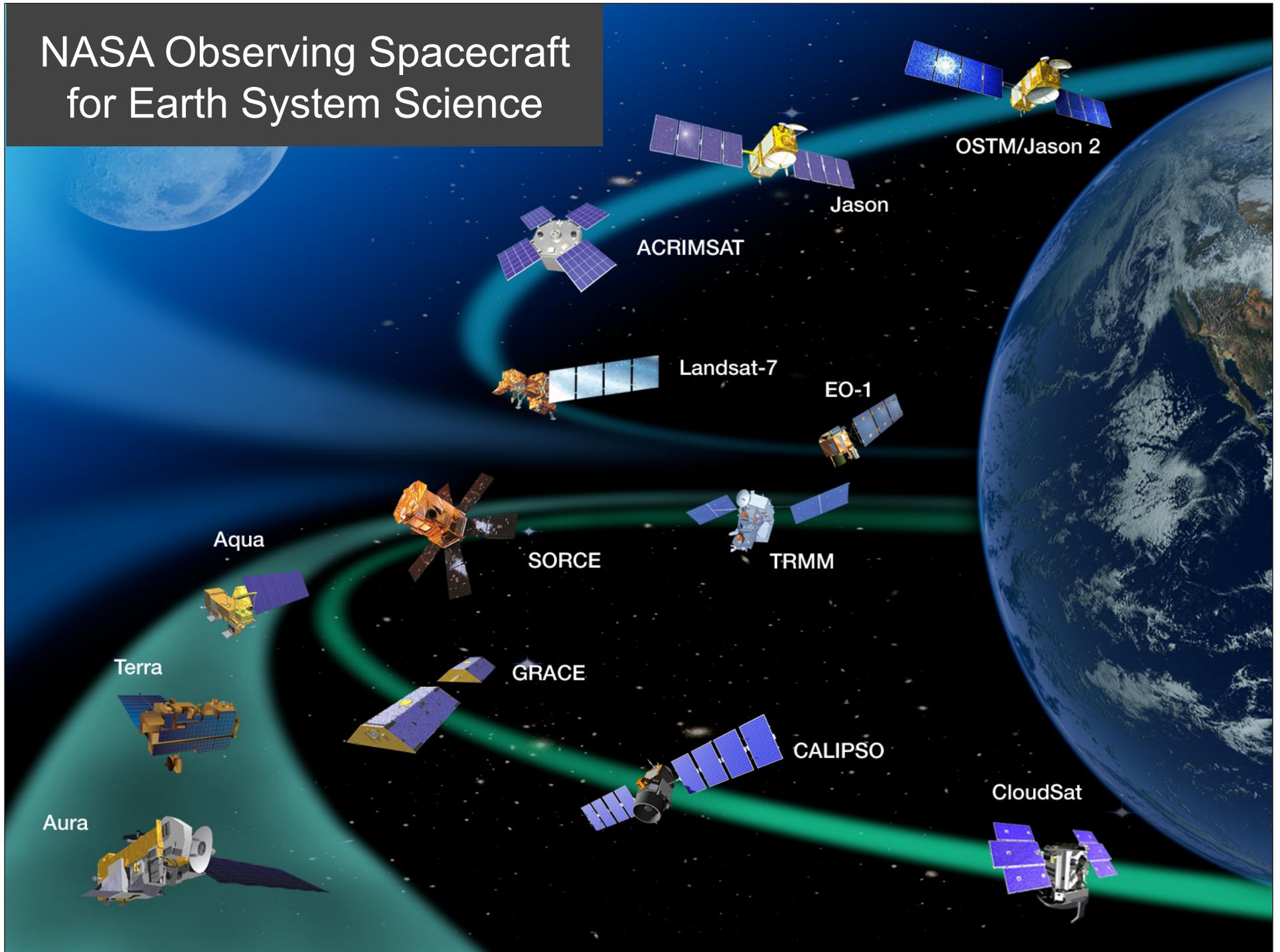


NASA and Earth Science

Studying Earth as a Complex System



NASA Observing Spacecraft for Earth System Science





Applications-Mission Workshop

February 1-3, 2010

Community Workshop to Explore and Identify Methods to Better Engage the Applications and End-User Communities in Early Phase Mission Planning

<http://applicationsworkshop.eventbrite.com/>

Some questions explored:

What communities have we engaged and which communities should we engage?

What are some best practices in engaging & interfacing with the applications' communities in mission development?

In addition to how the users can benefit, what can the applications community provide? What feedback can they provide and how to facilitate that? What are their roles and responsibilities?

This workshop is considered the first in a series of dialogues to maximize the return and minimize the cost of future missions for our national interest.



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Examples

Ecological Forecasting & Protected Area Management

Using the NASA-developed Terrestrial Observation and Prediction System (TOPS) in conjunction with MODIS satellite observations and ground-based data, NASA has developed a web-based tool for the National Park Service to map current conditions and forecast future trends in snow cover, stream flow, and vegetation productivity in Yosemite National Park. After its demonstration in Yosemite, NASA and the NPS will extend this mapping and forecasting tool to other national parks to support simulations of potential future states of the water supply and vegetation condition for managing protected ecosystems.

Aviation

In September 2009, NOAA directed their operational centers to accept NASA Cloud Property data for implementation into the NOAA hourly Rapid Update Cycle (RUC) model. With this direction, ESD/Applied Sciences investments in cloud property applications for the enhancement of operational NWP models for aviation is now entering the final phase of transition to operations. Satellite-derived phase and liquid water path products from MODIS, GOES, and AVHRR are utilized in this effort.



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Examples

Improved public health tracking systems for infectious diseases with the Centers for Disease Control

Advances in prediction of weather conditions (icing, turbulence, volcanic ash) for airplane pilots through the National Weather Service and the Federal Aviation Administration

Improved tracking of air pollutants with the Environmental Protection Agency for air quality management

Improving the Department of Agriculture's Global Economic Forecasting

International disaster management support with the US Agency for International Development



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Program Strategy

Goal 1: Enhance Applications Research

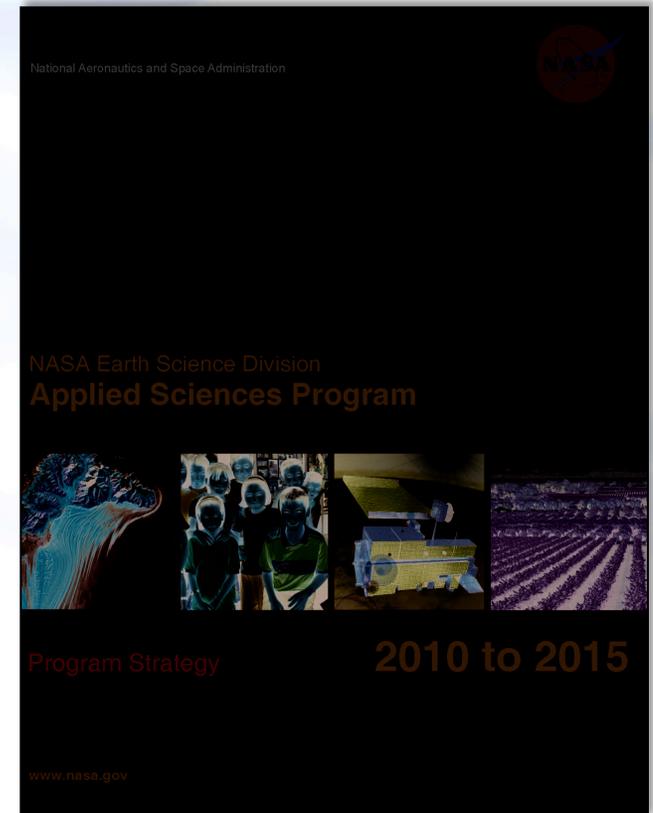
Advance the use of NASA Earth science in policy making, resource management and planning, and disaster response.

Goal 2: Increase Collaboration

Establish a flexible program structure to meet diverse partner needs and applications objectives.

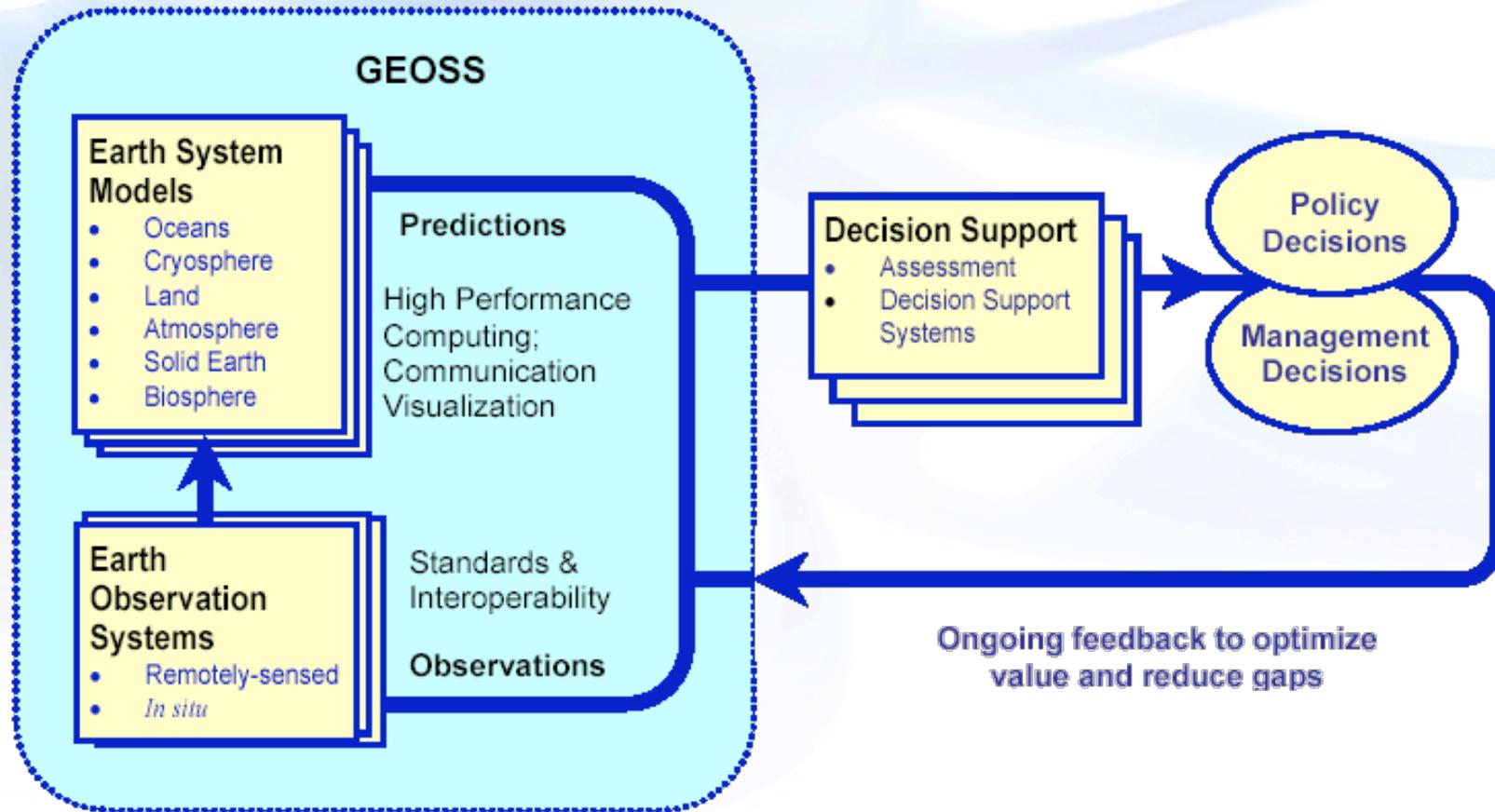
Goal 3: Accelerate Applications

Ensure that NASA's flight missions plan for and support applications goals in conjunction with their science goals, starting with mission planning and extending through the mission life cycle.





Earth Science for Society



NASA leads & actively supports numerous GEO tasks.
NASA supports the GEO UIC, ADC, and STC committees.



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Applications Areas

Applications to Decision Making: Eight Thematic Areas



**Agricultural
Efficiency**



Air Quality



Climate



**Disaster
Management**



**Ecological
Forecasting**



Public Health



**Water
Resources**



**Weather
(Aviation)**



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Near-term Priorities

Key Topics and Directions

- Performance Measures & Impact Evaluation
 - Project metrics to convey project & program successes
- Communicating Project Progress & Success
 - Substantive examples of accomplishments
- Applications-oriented Involvement and Support to Mission Planning and Implementation
- Transition of Successful Projects to Other Organizations
- Attention to Program Budget Obligation and Project Costing

“A productive, directed, substantive, and competent Applied Sciences will be essential for Earth Science.”

*– Michael Freilich, Earth Science Division Director
8-October-2009*



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Projects and Solicitations

- 1. Decision Support projects:** Collaborative with end-user organizations to integrate Earth observations into their decision-making activities and enable the adoption/transition for sustained use. Cost-sharing requirement. *Traditional type of projects solicited by Applied Sciences.*
- 2. Applications Feasibility projects:** Short-term, proof-of-concept projects to generate and test preliminary ideas for applications of Earth science products to determine their potential value and readiness for a more in-depth project.
- 3. Applications Knowledge projects:** Multiple-year projects focused on applied research to generate fundamental understanding of how Earth science can be scaled and applied to serve society and methods to enable institutions to apply new types of information in decision making activities.
- 4. Applied Sciences Teams:** Multiple-year teams of applications-specialists and scientists to address key applications-oriented challenges and critical data products needed by the applied community and end users. Modeled on NASA Mission Science Teams.
- 5. Joint Solicitations:** Joint funding for applied research and applications projects. Joint with other agencies and/or with NASA Research. Also includes funding for some applications-oriented projects that are identified in solicitations managed by the ESD Research Program's science focus areas.
- 6. Mission Teams:** Applications-oriented people on Mission Science Teams and on Science Definition Teams for future missions.
- 7. Targets of Opportunity**



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ROSES-2010

Solicitations in ROSES-2010

Direct

- A.29 Applied Sciences: Decisions
this is a summary appendix
- A.30 Climate and Biological Response:
Research and Applications
- A.31 Applications Feasibility Studies:
Public Health

Others possible & pending

Joint Efforts

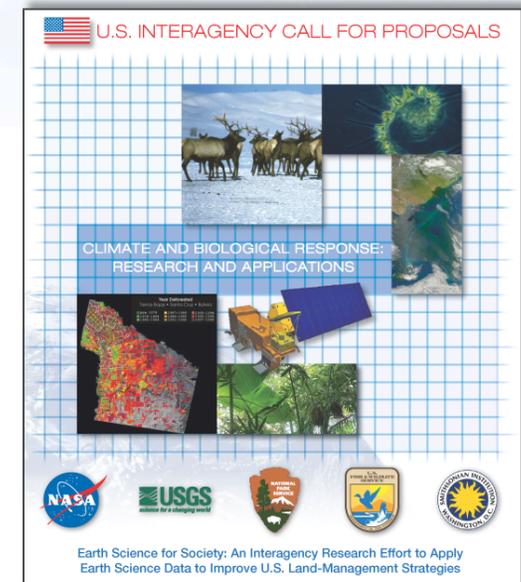
- A.5: Carbon Cycle Science
- A.14: Atmospheric Composition: Modeling
and Analysis
- A.15: Aura Science Team
- A.16: Terrestrial Hydrology
- A.21: Applications of Geodetic Imaging
- A.22: NPP Science Team

Featured Joint Solicitation (A.30)

An Interagency Research Effort to Apply
Earth Science Data to Improve U.S.
Land-Management Strategies

Research and applications to study how
ecosystems are responding to changes in
climate.

Goal is to place it
in the hands of
decision makers—
Federal, state, and
local managers, to
help as they craft
practical strategies
for managing the
impacts of a
changing climate.





US Earth Science

Innovation and Decision Support

The aggressive pursuit of understanding Earth as a system – and the effective application of that knowledge for society’s benefit – will increasingly distinguish those nations that achieve and sustain prosperity and security from those that do not.

*Preliminary Report of Earth Science Decadal Survey
National Research Council, 2005*

We seek solutions. We don’t seek – dare I say this? – just scientific papers anymore.

*Steven Chu (now Secretary of Energy)
San Francisco Chronicle, 22-March-2007*

Science, technology and innovation proceed more rapidly and more cost-effectively when insights, costs and risks are shared.

*President Obama
National Academy of Sciences, 27-April-2009*