NASA Applied Sciences Program

NOAA-NASA Workshop on Integrating Satellite Data Products for Ecosystem-based Management of Living Marine Resources

May 3-5, 2006

Lawrence Friedl & Woody Turner
NASA Applied Sciences Program
Science Mission Directorate

“Extending the societal and economic benefits of NASA research in Earth science, information, and technology …”
The overarching purpose of the Applied Sciences Program is to expand the societal benefits of the nation’s investments in NASA Earth science research.

Through partnerships, the Program enables the use of Earth science research to enhance the performance of decision support tools that organizations use to serve their management, business, and policy responsibilities.

- Work with partners to assess the potential value
- Where valuable, work to determine pathways to use the Earth science products on a sustained basis
NASA Observation
Spacecraft for Earth
Science Research

Future Spacecraft:
- Cloudsat
- OCO
- Glory
- OSTM
- Landsat-type mission
- CALIPSO
- NPP
- Aquarius
- GPM
- GPM
Earth System Models
National Aeronautics and Space Act of 1958 (as amended)
Section 102. The preservation of the role of the United States as a leader in aeronautical & space science and technology and in the application thereof …
Section 203. The [NASA] Administration shall … (3) provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

National Space Policy (1996)
NASA, in coordination with other departments and agencies as appropriate, will focus its research and development efforts in (parts of longer list):
- Earth observation to better understand global change and the effect of natural and human influences on the environment;
- Space technologies and applications to develop new technologies in support of U.S. Government needs and our economic competitiveness.

NASA 2006 Strategic Plan
In Sub-Goal 3a: The NASA Applied Sciences Program will continue the Agency’s efforts in benchmarking the assimilation of NASA research results into policy and management decision-support tools that are vital for the Nation’s environment, economy, safety, and security.
Approach Follows the GEOSS Architecture

GEOSS

Earth System Models
- Oceans
- Cryosphere
- Land
- Atmosphere
- Solid Earth
- Biosphere

Predictions
- High Performance Computing
- Communication Visualization

Decision Support
- Assessment
- Decision Support Systems

Policy Decisions

Management Decisions

Ongoing feedback to optimize value and reduce gaps

Earth Observation Systems
- Remotely-sensed
- In situ

Standards & Interoperability

Observations
Integrating Earth Science into Solutions

INTEGRATIONS

DATA

Earth-Sun Observatories
- Satellite
- Airborne
- In Situ

Planetary Models
- Land
- Oceans
- Atmosphere
- Solar

PREDICTIONS/FORECASTS

High-Performance Computing, Communication, and Visualization

STANDARDS AND INTEROPERABILITY

Partnership Area

Decision-Support Tools
- Assessments
- Decision-Support Systems
- Scenario Tools

Value and benefits to citizens and society

Policy Decisions
Management Decisions
Exploration Decisions

INPUTS
NASA and Research Partners

OUTPUTS

OUTCOMES

Partners with Decision-Support Tools

IMPACTS
Applications of National Priority

Application Program Activities

- Evaluate potential for NASA Earth science products to support partners
- Develop prototype products with partners; verify and validate paths for integration of Earth science products
- Document value and performance
- Support transition of products or techniques
- Communicate results and partners’ achievements
Benchmark Reports

Final products are “Benchmark Reports” to document the system performance and improvements

Partial list of reports to date (http://aiwg.gsfc.nasa.gov):


Application of Earth Science Satellite Observations to Improve Environmental Public Health Surveillance Systems, Sept. 2005

AQI - Application of Satellite Data for Forecasting Particle Pollution, Nov. 2003

RSVP Benchmark Report for Public Health, Sept. 2005

Aviation Current Icing Potential, July 2005

Initialization of the NCEP Eta/NAM Model DST with Uncoupled NLDASE Land Surface States, Sept. 2005


Air Quality – Surface Characteristics, Sept. 2005

Diver Visibility with Navy/NRL, 2004

Globally Assimilated Lateral Boundary Conditions to Improve CMAQ Ozone Estimates, Sept. 2005
Program Projects

- Solicited Projects
  - *usually Cooperative Agreements*

- Directed Projects

- Congressionally-directed Projects

- Rapid Prototypes (recent development)
  - *quick assessment of potential value*
  - *determines if full-scale project is appropriate*
<table>
<thead>
<tr>
<th>Solicitation</th>
<th>Awards Date</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Decisions CAN</td>
<td>6/05</td>
<td>FY06-FY08</td>
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<tr>
<td>ROSES 2005*</td>
<td>4/06</td>
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<td>FY11-FY13</td>
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* ROSES: Research Opportunities in Space and Earth Science
A collective research announcement for all NASA science programs
Recent ROSES05 CAN Awards (April 2006)

Utilizing remote sensing, modeling and data assimilation to sustain and protect fisheries: ecological forecasting at work

- Francisco Chavez, PI (MBARI)

Predicting Right Whale Distributions from Space: Enhancing an Operational System for Marine Ecosystem Modeling

- Andrew Pershing, PI (Cornell Univ. & Univ. of Maine)
Community Relationships

Academia, Industry, NGO

Extending space systems, technologies, capabilities

Applying modeling and decision support capabilities

NASA Earth System Science

Sharing knowledge, technology, capabilities from R&D of space systems

Partnering Organizations
NASA Applied Sciences Program has pre-purchased $5M worth of time on Project Columbia for supercomputer use by any & all Applied Sciences supported projects.
$250-300K

1-4 Project Concepts

Concepts need to allow NOAA/NASA program managers determine if and how to proceed with one or more projects.
Extending NASA Earth Science Results to Federal Partners:

An Example from Air Quality
“Improving National Air Quality Forecasts with Satellite Aerosol Observations”

BAMS, Sept. 2005 (86: 1249-1261)

Questions

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202-358-1599   LFriedl @ nasa.gov

Websites:

http://science.hq.nasa.gov/earth-sun/applications/

http://aiwg.gsfc.nasa.gov/
Backup
Systematic Approach

- **Evaluation** of potential capacity for NASA research results to contribute to partnering agency decision support tools
  - Formulation of a configuration to integrate results
- **Verification** that components could be physically connected into system configuration
- **Validation** of science and technology performance of the system through rigorous analysis of flow through of science data products in the integrated system
- **Benchmarking** of performance of the integrated system solution outputs in terms of value to decision makers.
Flight Missions in “extended period”

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### Flight Missions in “primary period”

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- **Launch Date**: 4/28
# Flight Missions in “formulation/development”

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**LRD** = Launch Readiness Date  
**EOPM** = End of Prime Mission  
**PDR** = Preliminary Design Review  
**CDR** = Critical Design Review  
**MC** – Manufacturing Completed  
**I&T** = Integration & Test Completed
### Decisions CAN

**Total Step-2 Full Proposals:** 172  
**Awards:** 24 proposals (18 projects)

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<td>Solutions Networks</td>
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### ROSES A.24

**Total Step-2 Full Proposals:** 98  
**Awards:** 21 projects (April 06)

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<td>Solutions Networks</td>
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**MODIS – By far the most often mentioned sensor.**

Numbers include proposals serving more than one application.