The Group on Earth Observations and LCLUC

Presentation for the LCLUC Science Team
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Earth Science Division
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Topics

- International: GEOSS/GEO
- US: IEOSS/USGEO
- NASA and GEO/USGEO
- GEO and LCLUC
- Issues
GEOSS: Global Earth Observations System of Systems

- An international political endeavor to recognize the importance of Earth Observations
- Supports integrated Earth observations for scientific, economic, & societal benefits
- Builds on and supports existing Earth-observation systems by coordinating their efforts, addressing critical gaps, and supporting data sharing and interoperability
The Premise Behind GEOSS
A distributed system of systems:
- Improves coordination of strategies and observation systems
- Links all platforms: *in situ*, aircraft, and satellite networks
- Identifies gaps in our global capacity
- Facilitates exchange of data and information
- Improves decision-makers’ abilities to address pressing policy issues
• EOS I
  – July 2003, Washington, DC
  – 33 Countries
  – 20 International Organizations
• EOS II
  – April 2004, Tokyo
  – 47 Countries
  – 26 International Organizations
• EOS III
  – February 2005, Brussels
  – 58 Countries
  – 43 International Organizations
  – Agree on 10-Year Implementation Plan
  – Establish Group on Earth Observations (GEO) to implement plan
• EOS IV
  – November 2007, Johannesburg
  – 68 Countries
  – 46 Participating Organizations
Established in March 2005 as a standing subcommittee of the National Science and Technology Council Committee on Environment and Natural Resources.

Co-Chairs: Office of Science and Technology Policy (OSTP), NASA, NOAA

16 US Federal Agencies, including NASA, USGS, EPA, US State Department, National Science Foundation
USGEO Co-Chairs 2007

- Dr. Teresa Fryberger (NASA)
- Dr. Gene Whitney (OSTP)
- Ms. Helen Wood (NOAA)
Integrated Earth Observation System (IEOS):

“…to develop and begin implementation of the U.S. framework and 10 year plan for an integrated, comprehensive Earth observation system to answer environmental and societal needs, including a U.S. assessment of current observational capabilities, evaluation of requirements to sustain and evolve these capabilities considering both remote and in situ instruments, assessment of how to integrate current observational capabilities across scales, and evaluation and addressing of data gaps”

“…to formulate the U.S. position and input to the international ad hoc Group of Earth Observations (GEO) as formed at the Earth Observation Summit on July 31, 2003.”
Implementing the IEOS Strategic Plan:

Six Near-Term Opportunities

Near term opportunities are systems that
  • Leverage/build on/integrate existing systems or components
  • Have tangible, near-term results
  • Demonstrate the utility of integration and allow for learning
  • Meet high priority national needs and crosscut societal benefit areas

**Improved Observations for Disaster Reduction**  September 2006

**National Integrated Drought Information System**  September 2006

**Air Quality Assessment and Forecast System**  September 2006

**Global Land Observation System**  Under development

**Sea Level Observation System**  Under development

**Architecture and Data Management**  Under development
• Observations for scientific, economic, & societal benefits
• Focus on policy needs
  • Society needs information & services—beyond data
• GEO is logical outlet
  • Countries
  • Institutions
• Draw from previous and ongoing work
  • IGOS, CEOS, WMO, GCOS
Future Interaction Between CEOS and GEO

• The GEOSS Implementation Plan provides a framework for enhanced cooperation efforts between space agencies

• GEOSS provides a venue for CEOS principles, activities, and plans to be communicated to a broad, global community

• CEOS strives at building its own Long-Term Implementation Plan for the space component of GEOSS, with a view to support the targets of the nine GEO Societal Benefit Areas
• **Disasters**: Reducing loss of life and property from natural and human-induced disasters
• **Health**: Understanding environmental factors affecting human health and well-being
• **Energy**: Improving management of energy resources
• **Climate**: Understanding, assessing, predicting, mitigating and adapting to climate variability and change
• **Water**: Improving water resource management through better understanding of the water cycle
• **Weather**: Improving weather information, forecasting and warning
• **Ecosystems**: Improving the management and protection of terrestrial, coastal and marine resources
• **Agriculture**: Supporting sustainable agriculture and combating desertification
• **Biodiversity**: Understanding, monitoring and conserving biodiversity
GEO Element Tasks related to LCLU/C

- **Climate**
  - *CL-06-02*: Key terrestrial observations for climate

- **Ecosystems**
  - *EC-06-01*: Integrated global carbon observation (IGCO)
  - *EC-07-01*: Global ecosystem observation and monitoring network

- **Agriculture**
  - *AG-06-04*: Forest mapping and change monitoring
  - *AG-07-03*: Operational agricultural monitoring system

- **Biodiversity**
  - *BI-07-01*: Biodiversity observation and monitoring network
  - *BI-07-02*: Invasive species monitoring system
Linking Earth Observations to Societal Benefits

Earth System Models
- Weather
- Climate
- Atmosphere
- Other...

Earth Observation Systems
- Remotely-sensed
- In situ

Data

Predictions

Decision Support

Policy Decisions
Management Decisions
Personal Decisions

Societal Benefits

On-going feedback to optimize value and reduce gaps
USGEO Topics for
EOS IV Ministerial Conference

- Disaster
  - *Framework for Integrated Disaster Risk Reduction*
- Human Health
  - *Air Quality Assessment and Forecasting*
- Climate
  - *Drought Early Warning*
- Agriculture, et al.
  - *Global Land Surface Characterization*
    - Mid-Decadal Global Land Survey
- Data Management
  - *Global Environmental Information Delivery System (GEONETCast)*
Contact Information

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Backup Slides
CEOS Potential Role in GEO 2007-2009 WP

• Example: Health
  – Continuing Tasks
    • HE-06-03 – Earth observation and health pilot projects
  – Three new Tasks
    • HE-07-P1 – Strengthen observation and information systems for health
    • HE-07-P2 – Environment and health monitoring and modeling
    • HE-07-P3 – Integrated atmospheric pollution monitoring, modeling, and forecasting

* Note: CEOS has a potential role as a Contributing Organization in all three new tasks.
CEOS Potential Role
in GEO 2007-2009 WP

• Example: Climate
  – Continuing Tasks
    • CL-06-01 – Sustained reprocessing and reanalysis efforts
    • CL-06-02 – Key data from satellite systems (CEOS Lead and POC)
    • CL-06-03 – Intergovernmental mechanisms for terrestrial observations
    • CL-06-05 – GEOSS IPY contribution
    • CL-06-06 – Global ocean observation system (postponed)
  – CEOS has a potential co-Lead role in CL-06-06 with GCOS.
  – New Task
    • CL-07-P1 – Seamless weather and climate prediction system
Air Quality and Atmospheric Monitoring

GEO Task HE-07-P3 – Integrated atmospheric pollution monitoring, modeling, and forecasting
EPA AIRNow Use of NASA MODIS Data

Terra & Aqua Satellite Direct Broadcast of MODIS instrument data via commercially available ground station

Products (Near Real Time)
- DB Aerosol Optical Depth (MOD04_L2)
- DB Cloud Optical Thickness (MOD06_L2)

Products
- Aerosol Optical Depth (MOD04_L2)
- Cloud Optical Thickness (MOD06_L2)

TERRA MODIS
- ~10:30 local overpass

AQUA-1 MODIS
- ~1:30 local overpass

Direct Broadcast

SSEC/CIMSS
Univ. of Wisc. Madison (MIPPS)

NOAA
- Products
  - EDAS Forecast Data

NASA Langley
- Products
  - MODIS/AIRNow Data Fusion
  - Site Static Data

US EPA AIRNow
- AIRNow Forecasters

Products
- AIRNow Hourly PM$_{2.5}$ Data

NASA Goddard Data Center

NASA Goddard Science Team Products Algorithms

State & Local
Canadian Providences
NASA Initiatives--Using Real-time Aqua/MODIS data to avoid Aura/TES Cloud-Obscured Measurements

The A-Train

- Nominal 15 minutes orbital separation
- Integration of Research Capabilities
- Transition to Operations
“Improving National Air Quality Forecasts with Satellite Aerosol Observations”

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

The 2007 GEO Ministerial Summit

• Cape Town, South Africa, on 28-29 November 2007 immediately followed, on 30 November, by the 4th Earth Observation Summit.

• Preparation for the Summit:
  ▪ Report on Progress: will be approximately 20 pages in length and will describe the progress of GEO since the last Earth Observation Summit. Will include 3-5 major themes for discussion
  ▪ Declaration: A one page document that will provide a record of the Ministerial Summit and set clear milestones for the future.

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Observations

On-going feedback to optimize value and reduce gaps