Earth Observations for Societal Benefits: Research Directions

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Topics

- Global and Local Challenges
- A Renewed Imperative for Earth Observations
- Baselines and New Observations
- Research Directions
Setting the Stage

- **Food Security**: the expectation that people will have sufficient food of high quality to sustain themselves;
- **Energy Security**: the need of societies for supplies of abundant, safe, and environmentally acceptable supplies of energy;
- **Early Warning of Floods, Drought, Storms, Landslides, Earthquakes, and other natural hazards**: the need to prepare and provide warning to populations at risk of severe and sudden events;
- **Sustainability of Ecosystem Services**: the need to maintain the supply of provisioning, regulating, cultural, and supporting services from ecosystems for meeting basic human needs;
- **Environmental Quality and Contamination**: the need to maintain a healthy environment with a minimum of pollution and contamination;
- **Public Health**: the need to maintain and enhance the health status of people;
- **Education and Outreach**: the need to create and maintain a scientifically literate public in an increasingly technologically dominated world.
Global and Local Challenges

Urbanization and Development
Global and Local Challenges

- Water and Food Security
Global and Local Challenges

 Natural Hazards
Global and Local Challenges

Natural Resource Management
Global and Local Challenges

Climate Change and Energy
A Renewed Imperative

- How will Earth science and observations help?
- Increase human well-being as well as satisfy scientific curiosity
  - Safety, health, prosperity
  - Maintaining services we depend on
- Building a capacity for delivering tangible benefits
Baselines and New Observations

- Enormous benefit to continued baselines of environmental data
- Quantification of trends, identifying changes for response
- Data for models of future
- New observations provide opportunity for more efficient delivery of benefits, but cannot simply replace baselines
Research Directions

- Must understand who benefits from using observations and how they do so
- How are observations actually used by people?
  - Intermediate organization (e.g. a weather service)
  - Directly (e.g. Google Earth or precision agriculture)
- How are decisions made with the information?
Research Directions

- What is best way to access data?
  - Historical archives
  - Real-time access
- Are the observations used directly or as input to a numerical model?
- What information is used in addition to the Earth observations?
Research Directions

- Must move beyond a collection of case-studies to general understanding
- How valuable are the remotely-sensed data?
- How is such information used in both public and private sectors?
- What are the true barriers to use?
- How is feedback to the agencies structured and used?
Learning from Experience

- How do NASA and NOAA currently set priorities for missions/observations, at least in principle?
- Measurements/programs that have made the transition from research into operational modes successfully - e.g. numerical weather forecasting
- Measurements/programs that have become “quasi-operational” - e.g. fire detection, air quality, agricultural output, famine early warning
Learning from Experience

- No stable institutional home for receiving recommendations about benefits in either NASA or NOAA
- Need to have processes in NASA and NOAA that recognize the actual benefits that are generated in addition to their scientific foundation
- Communities have vastly different experiences in using these observations and therefore abilities to generate recommendations
From Serendipity to Design

- New processes for identifying needs, especially in “new” areas
- Research programs on how applications have been usefully developed in the past and barriers to application
- Importance of continued access to data and information products
- Enhancing the ability of newer communities to use observational data