NASA Role Toward Increasing National Resilience to Natural Hazards and Disasters

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Resilience to Hazards and Disaster

• Defn. – ability to recover quickly from misfortune or change

• Resilience to hazards and disaster results in less loss of life and property during an event and a faster and less costly recovery

• Resilience requires attention to the full hazard management cycle:
  – Understanding of hazards
  – Hazard and vulnerability assessment
  – Forecast and warning
  – Response
  – Recovery
  – Mitigation
Natural Hazards and Disasters Focus

NASA basic and applied research programs and observations support the White House Office of Science and Technology Policy (OSTP) Committee on Environment and Natural Resources (CENR) Subcommittee on Disaster Reduction (SDR)

• Six Grand Challenges:

1. Provide hazard and disaster information where and when it is needed
2. Understand the natural processes that produce hazards
3. Develop hazard mitigation strategies and technologies
4. Recognize and reduce vulnerability of interdependent critical infrastructure
5. Assess disaster resilience using standard methods
6. Promote risk-wise behavior
To bring NASA capabilities in the area of spaceborne and airborne platforms and observations, higher level data products, and modeling and analysis to improve forecasting, mitigation, and response to natural disasters

- As an agency with spaceborne, airborne, and modeling and analysis capabilities, NASA contributes to:
  1. Provide hazard and disaster information where and when it is needed

- As a research agency NASA contributes to:
  2. Understand the natural processes that produce hazards
  3. Develop hazard mitigation strategies and technologies
  4. Recognize and reduce vulnerability of interdependent critical infrastructure
Natural Disasters Plan

• NASA began developing a natural disaster response plan in 2010
• Flow NASA observations to the end user, as appropriate
• Be responsive to natural disasters within the context of NASA’s mission
• Understand and catalogue NASA capabilities and end users
Catalogue NASA Capabilities for a Disaster Response Plan

- **Spaceborne**
  - Existing missions: MODIS, ASTER, Landsat, QuikSCAT, TRMM, EO-1, JASON…
  - Decadal Survey Missions: SMAP, DESDynI, HyspIRI
- **Airborne Instruments**
  - UAVSAR – Radar
  - LVIS – Lidar
  - AMS, MASTER – Thermal Infrared
  - HIWRAP, APR2, HAMSR, HIRAD, PALS
  - MAPIR – Active and passive microwave
- **Data processing and analysis**
- **Modeling and analysis**
1. What is the nature of deformation at plate boundaries and what are the implications for earthquake hazards?
2. How do tectonics and climate interact to shape the Earth’s surface and create natural hazards?
3. What are the interactions among ice masses, oceans, and the solid Earth and their implications for sea level change?
4. How do magmatic systems evolve and under what conditions do volcanoes erupt?
5. What are the dynamics of the mantle and crust and how does the Earth’s surface respond?
6. What are the dynamics of the Earth’s magnetic field and its interactions with the Earth system?
Applied Sciences Program

Program Elements

Agricultural Efficiency
Air Quality
Climate
Natural Disasters

Ecological Forecasting
Public Health
Water Resources
Weather

Applied Sciences Natural Disasters Program

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Applied Sciences Program Approach to Integrated System Solutions

Earth System Models
- Land, Atmosphere, Oceans, Cryosphere, Coupled Models
  - Model Products, Data Assimilation, Predictive Capabilities

Earth Observatories & Measurements
- Satellite, Airborne, Ground, In-situ
  - Missions, Sensors, Data Products

Data

Predictions/Forecasts
- High-Performance Computing, Communication, and Visualization

Observations

Standards and Interoperability

Partnership Area

Decision Support Systems
- Assessments
- Scenario Tools
  - Analysis to support decision-making processes & actions

Policy Decisions

Management Decisions

Outcomes

Impacts

Value and Benefits to citizens and society

NASA and Research Partners

Partners with Decision Support Systems

Inputs

Outputs

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