

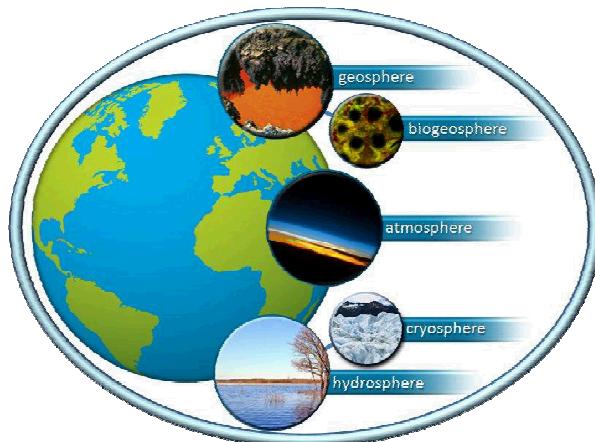
Sandia  
National  
Laboratories

*Exceptional  
service  
in the  
national  
interest*

# Geoscience Research Foundation Strategy

Marianne C. Walck

October 3, 2012



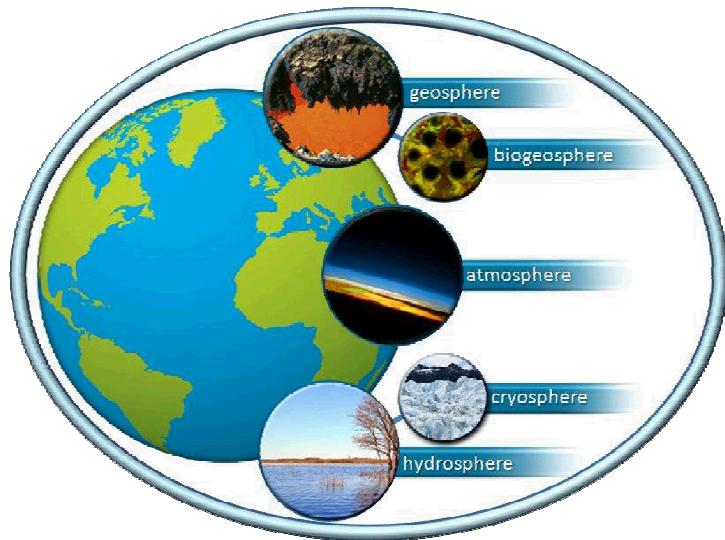
U.S. DEPARTMENT OF  
**ENERGY**

**NNSA**  
National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

# Geoscience Research Foundation

*Where national security comes down to earth:  
apply deep geoscience expertise to explore and solve  
problems at the intersection of the earth and  
engineered environments*



## NATIONAL SECURITY PROBLEMS RELATED TO GEOSCIENCE

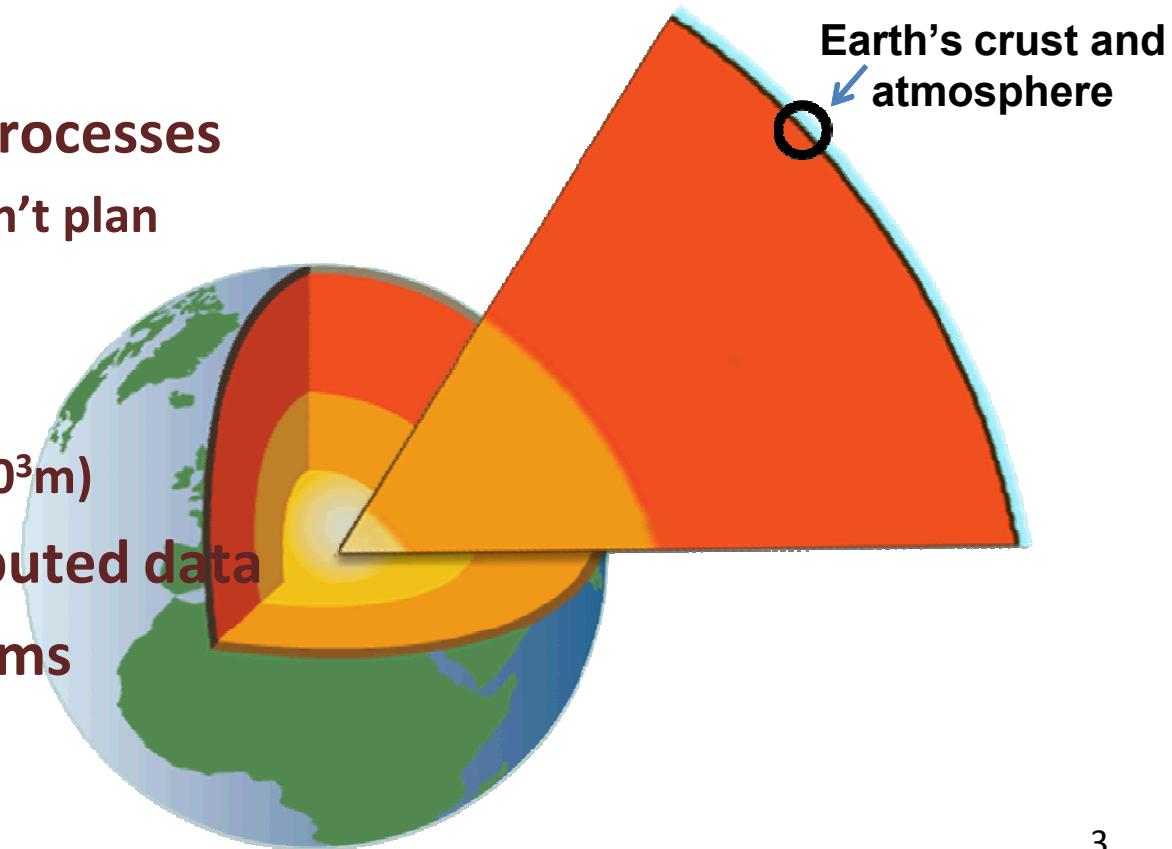
- Detecting, Monitoring, and Defeating Subsurface Facilities
- Monitoring and Verifying Treaties
- Testing Weapons Underground
- Using the Subsurface for Safe and Secure Material Storage
- Maintaining Secure Energy Supply
- Maintaining a Healthy Geosphere
- Preparing for and Responding to Natural Disasters
- Preparing for and Adapting to Climate Change

# What is the RF scope?

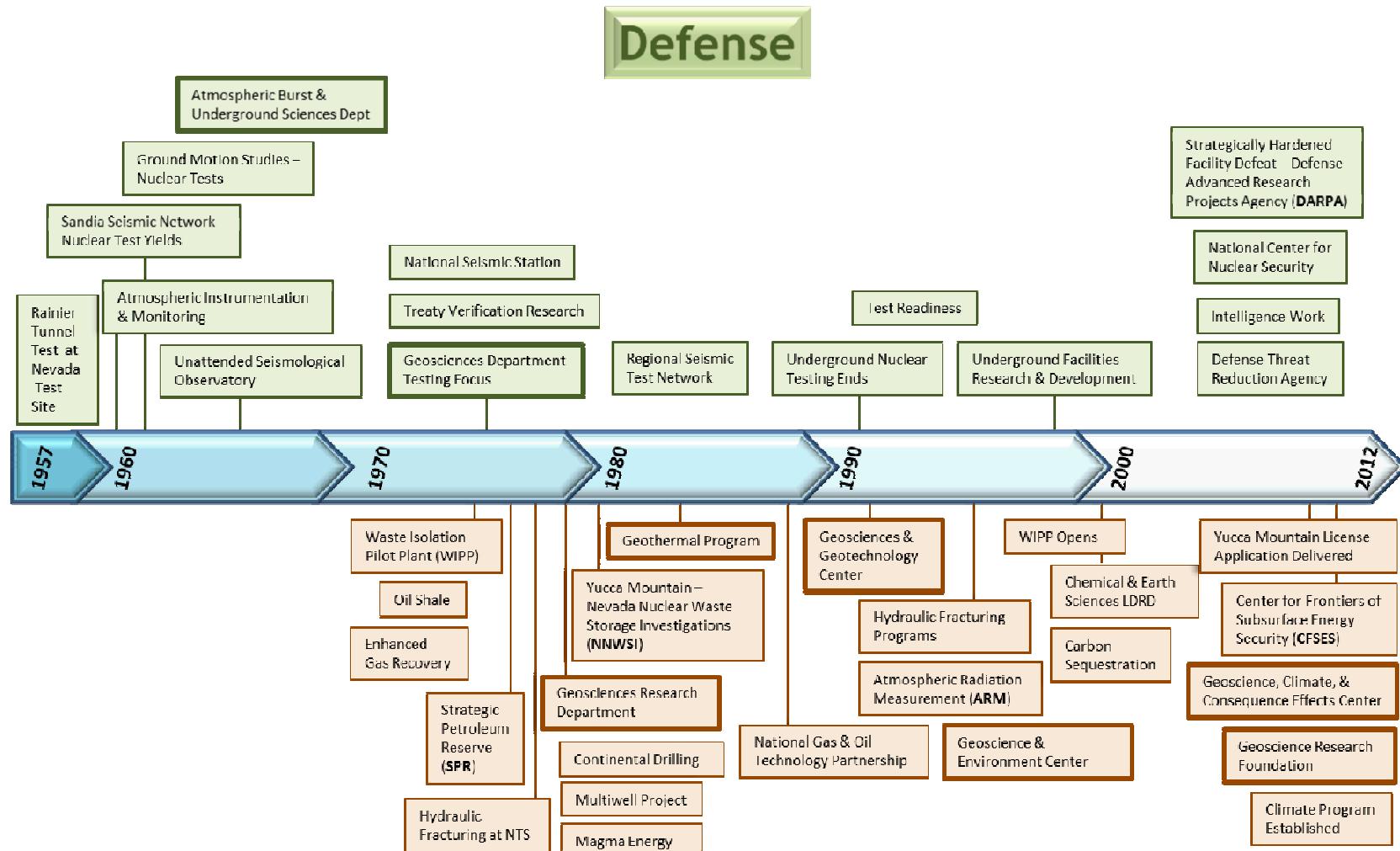
- Earth's surface  $\pm \sim 100K$  feet (30 km)
- Subsurface, surface, atmosphere
- National Security Drivers

## Attributes

- Natural materials and processes
  - experiments that you can't plan
- "Multi-physics"
- Multiple scales
  - –nano ( $10^{-9}$ m) to field ( $10^3$ m)
- Sparse, unevenly distributed data
- Ill-posed inverse problems

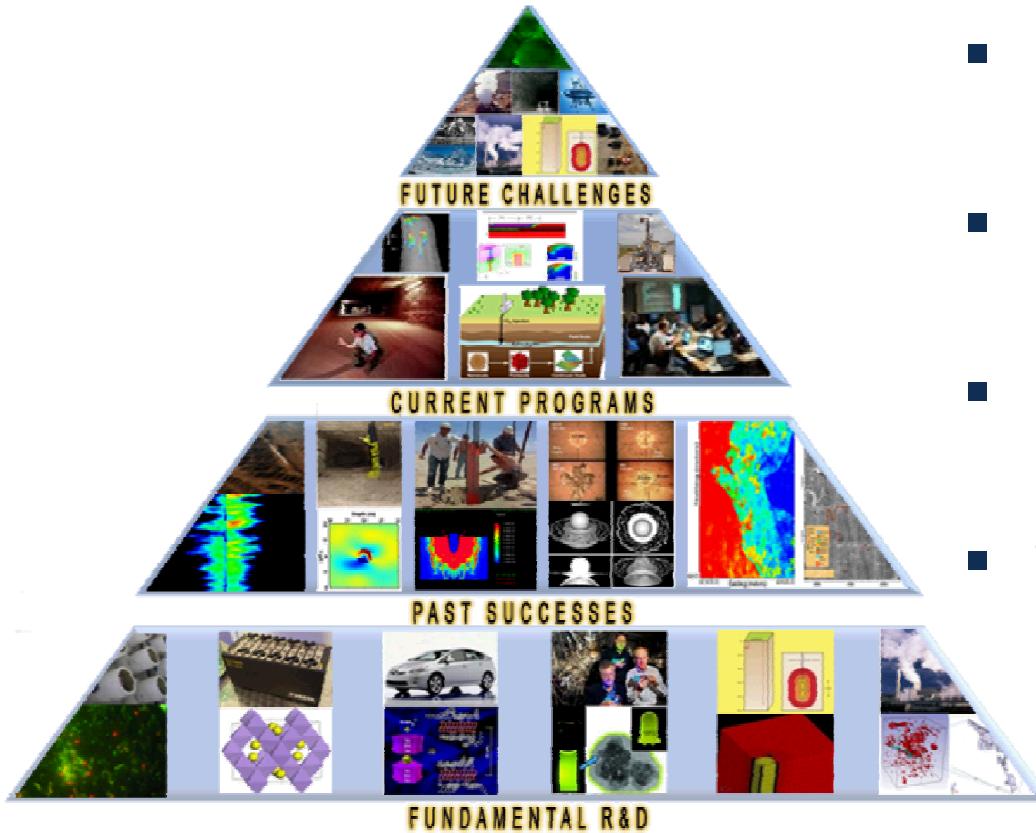


# A bit of SNL Geoscience History...



Energy, Research, and Climate

# Summary of Current State



- Research to Development to Application spectrum
- Driven by mission – capability grew through mission need
- Leverage overall laboratory capabilities
- Broad set of projects/programs with many sponsors
- The new research foundation
  - Provides management focus
  - Enables internal coordination
  - Provides LDRD resources
  - Focuses on external visibility
  - Drives strategy development

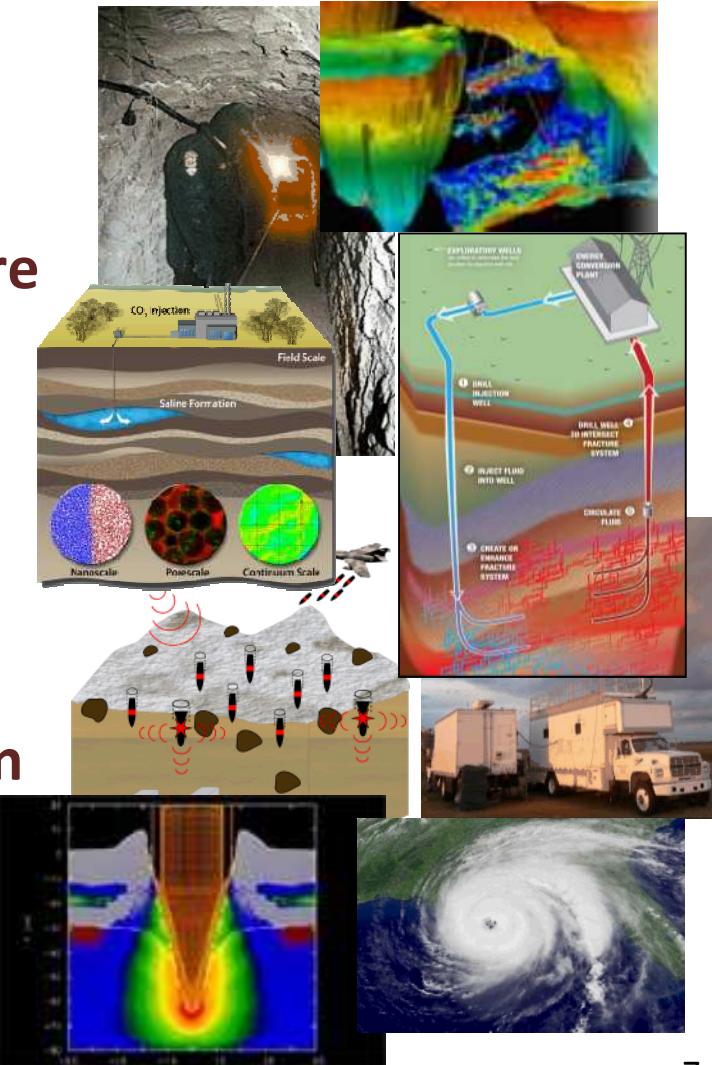
# Envisioned End State

- **External End State: SNL is the premier lab for Earth Engineering solutions to national security problems**
  - Nationally recognized solutions to tough problems combining the earth and engineered environments
  - Leadership, recognition, and service in the professional community
- **Internal End State: Community, Interaction, Infrastructure**
  - Well-established internal Geoscience Community – energized workforce
  - Healthy and vigorous relationship with all Research Foundations; impact to all business units
  - Healthy infrastructure

# Research Focus

*With a keen focus on mission-driven national security applications,*

- **Spanning Scales of the Earth-Atmosphere System: Predict Multi-Physics Behavior**
- **Earth System Engineering and Sensing: Achieve Unprecedented Innovation, Speed and Resolution**
- **From Subsurface to the Atmosphere: Characterize and Predict Geomaterials in Extreme Environments**



# Why Sandia?

- **Interdisciplinary expertise**
  - Earth and Atmospheric Science
  - Engineering Science
  - Algorithms /Computer Science
  - Drilling
  - Materials Science
- **Unique facilities – related to the research objectives**
  - Geomechanics Laboratory – unique within the DOE laboratory community
  - Facility for Acceptance, Calibration and Testing (FACT Site)
  - Drilling Research – field and lab – for harsh environments
  - Arctic facility in Barrow, AK
  - Institutional Computing
- **Focus on National Security**

# Path to the End State - External

- **Build external recognition of our research**
  - Clear leadership expectation and support
  - Reinforce recognition in the three focus areas
- **Develop the Sandia 'brand' for geoscience**
  - Focusing on the interface between the earth and engineered environments for national security applications
  - Plan for external professional engagements
- **Focus on a few key partnerships**
  - University, industry, NGO
  - Plan for developing larger impact programs through key partners
- **Monitor progress through metrics**

# Path to the End State - Internal

- **Integrate Geoscience throughout SNL**
  - research foundation entanglement
  - build broader relationships with business units
- **Build the sense of community for Geoscience within SNL**
  - Community-wide events
  - Continued management commitment and action
  - Continue and improve investment in facilities and staff support
- **Monitor progress through metrics**

# Discussion