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Sandia Geophysics Capabilities and Current Research

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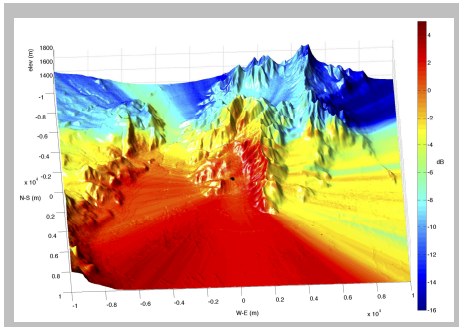
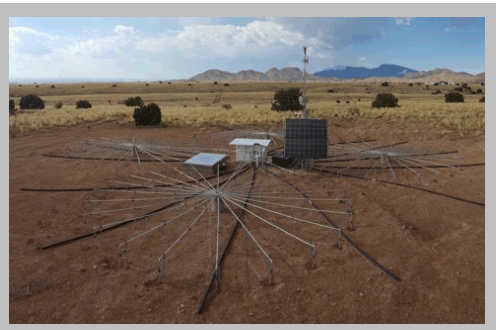
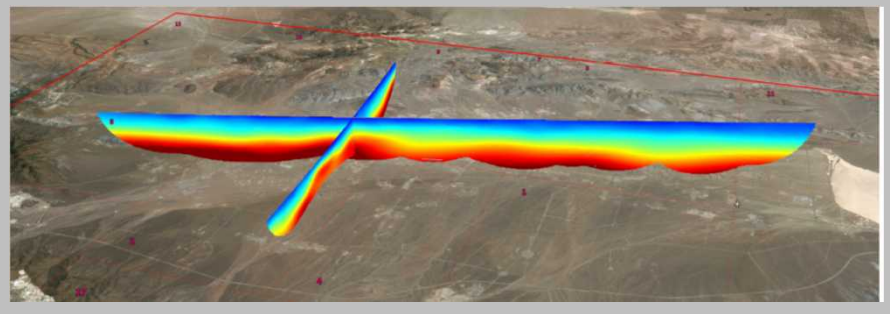
Manager

Geophysics Department 6911

December, 2016







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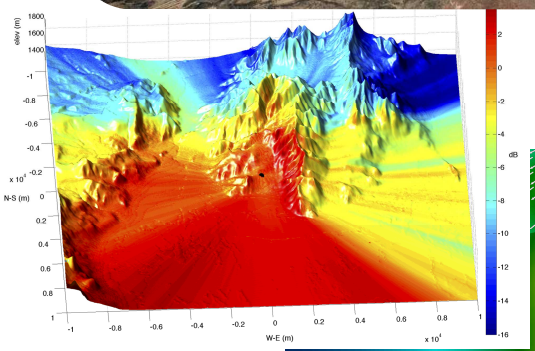
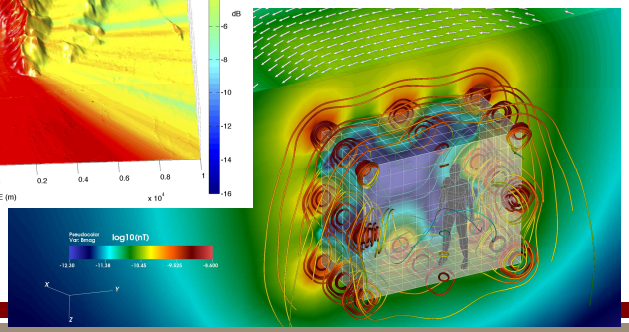
People

- 18 department members
  - 8 technical staff
    - 6 Ph.D.; 2 M.S.
  - 3 technologists
  - 5 graduate student interns

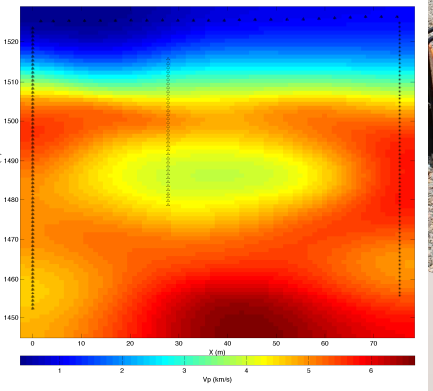
Capabilities Summary

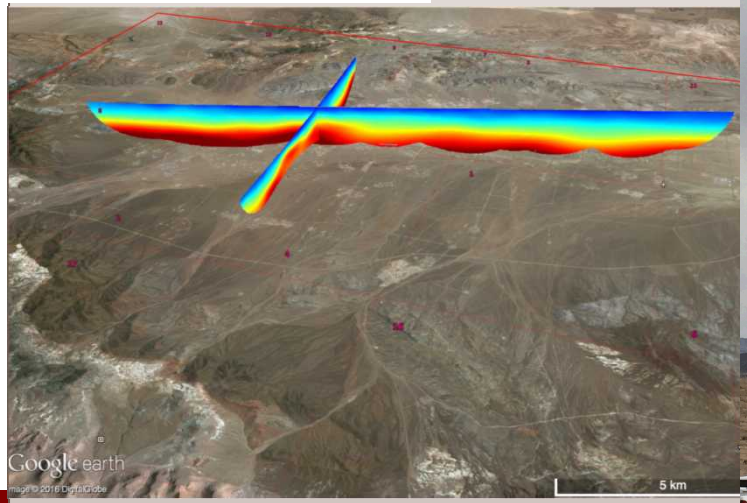
- Field data collections for active and passive seismic, acoustic, electromagnetic deployments
- Long- to short-term passive monitoring, array design, measurement tool development, and data processing
- Earth material characterization in complex, real-world environments including underground structures
- Source inversion, characterization, and localization
- HPC modeling and simulation tools for seismic, acoustic, electromagnetic, and hydroacoustic physics in realistic 3-D environments using massively parallel design





Equipment



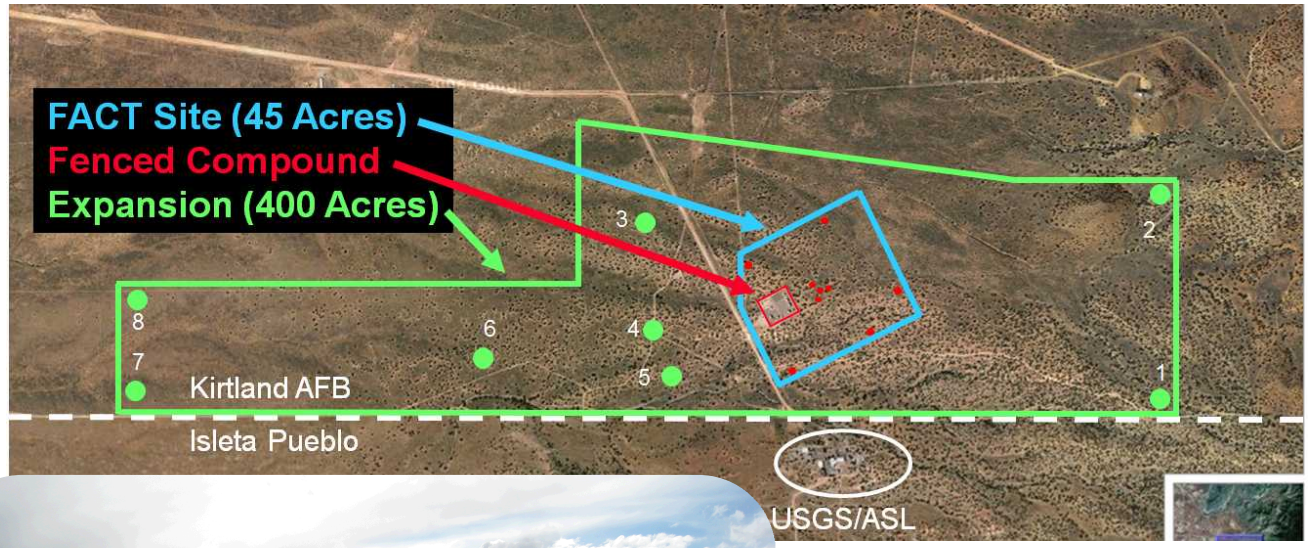


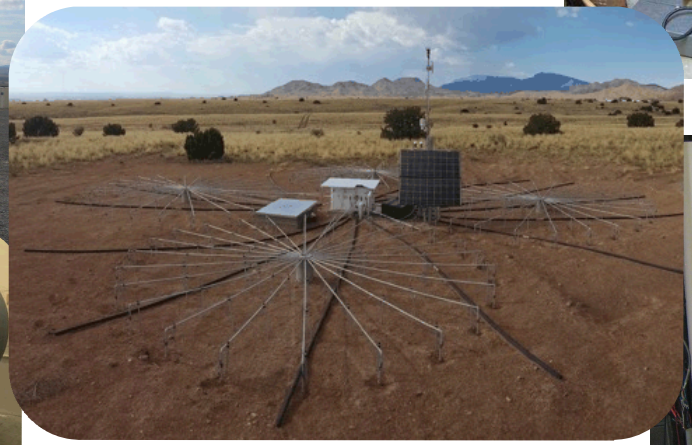
Other equipment

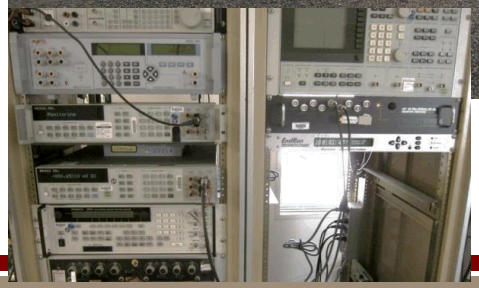
- Gravity Meters
  - Scintrex CG-5 Autograv
  - LaCoste and Romberg Model G
- Seismometers
  - 7 Nanometrics Trillium Compact Broadband
  - 14 Teledyne Geotech GS-13 Short Period
  - 5 Guralp CMG3 Broadband
- EM
  - Geonics time-domain EM PROTEM data logger with 3C high frequency receiver coils + EM47 transmitter
  - Geonics frequency-domain EM34 borehole GPR system
- Geometrics 24-channel borehole hydrophone array
- 2 Geometrics Geode seismographs (24-channels each with requisite number of 4.5 Hz vertical and horizontal geophones)
- 21 six-channel Reftek RT130 seismic recorders
- 4 Kinematics EpiSensor Accelerometers
- Trimble Real-Time Kinematic GPS system
- TopCon Total Station laser theodolite
- Field Equipment Staging Area (FESA)

Facility for Acceptance, Calibration, and Testing (FACT) site

Sandia National Laboratories







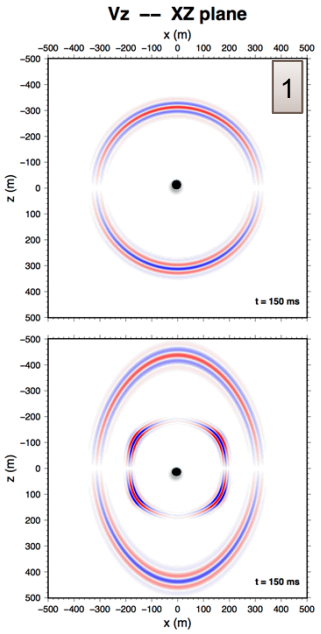
Geophysics Modeling Codes

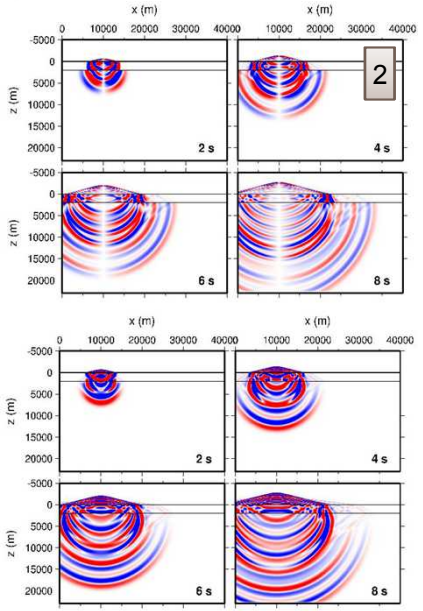
3-D Seismic Wave Propagation

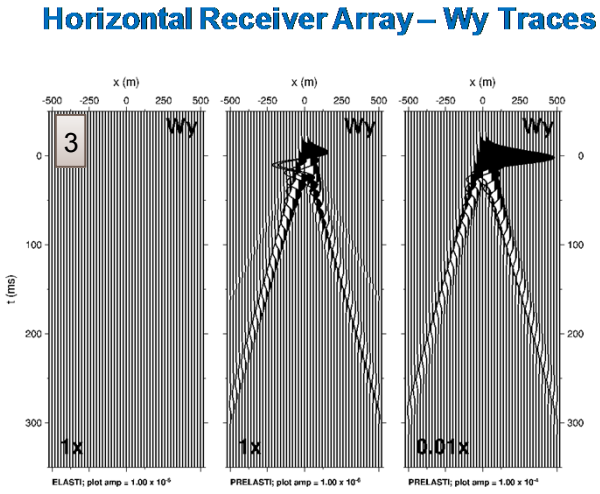
- **ORTHORHOMBI** – orthorhombic elastic media (up to 9 elastic moduli).
- **PRELASTI**– isotropic elastic medium subject to an ambient tectonic stress field.
  - Development to study why/how underground explosions generate large amounts of shear wave energy
- **ELASTI-ACUSTI** – Simultaneous elastic-acoustic wave propagation simulation in 3D mixed solid-fluid models (i.e., atmosphere overlying earth, or ocean overlying solid sub-seabed).
  - Fully coupled elastic-acoustic wave propagation within a two-phase medium is achieved with high accuracy and efficiency.

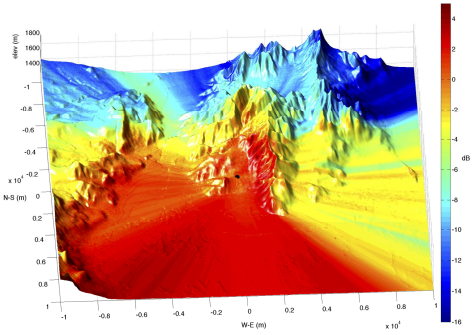
Acoustic

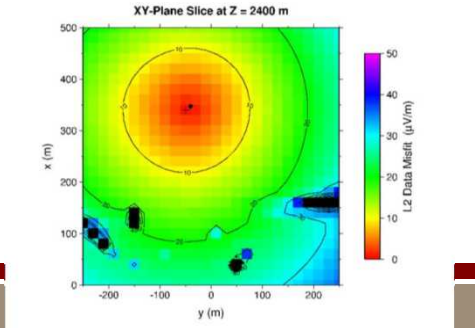
- **TDAAPS** (Time-domain Atmospheric Acoustic Suite)
  - 3-D linear, moving media capable; applicable to hydroacoustics
- **EM**
  - **BSI (**Born Scattering Inversion)
  - **FDEM** (Finite Difference EM)
  - **BHFEM3D**











Research Sponsors

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- NNSA/Defense Nuclear Nonproliferation R&D
- Office Of Science/EERE
- Office of Science/Fossil Energy

OGA

- DTRA
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Industry

- CARBO Ceramics