NSF’s Network for Earthquake Engineering Simulation (NEES)

- NSF Engineering Directorate MRE&FC Program to build the next generation of EE research facilities
- 15 Awards for Earthquake Engineering Equipment Sites nationwide
- UCSB NEES Award to build two permanently instrumented field sites for monitoring ground motion, ground failure, liquefaction, and soil-structure-interaction
NEES Fundamentals

- NEESgrid connects equipment sites to remote users
- Telepresence – Remote observation of data and video from equipment sites
- Teleoperation – Remote control of equipment systems at sites
- Shared-Use – Open access to all equipment sites
UCSB NEES Field Sites within HPWREN coverage area

Number of times per century the shaking from earthquakes will exceed 20% the force of gravity in So. California. Significant damage to older buildings begins at this level.

(Map produced by the Southern California Earthquake Center (BSSA, April 1995); GMT graphics by K. W. Hadnott, U. S. Geological Survey)
HPWREN Connectivity a Critical Component of the NEES Field Sites: HPWREN is an extension of NEESgrid
GVDA NEES focus: Soil-Structure-Interaction experimental structure

Remote control of shakers and data acquisition systems coupled with streaming data will provide a unique research and educational facility for the earthquake engineering community.
Wildlife Liquefaction Array will also use HPWREN to bring data back to UCSB and the NEES central repository in real time.

Monitoring for Liquefaction using Pore Pressure sensors and Accelerometers.
UCSB Depends on HPWREN

☐ The Telepresence and Teleoperation capabilities, an essential component of any NEES project, would not be possible at the remote field sites without HPWREN
UCSB’s Borrego Valley Downhole Array is also now using HPWREN Communications

Data Acquisition System Located in Shelter

Borehole and Surface Accelerometers
QuickTime™ and a Photo decompressor are needed to see this picture.
HPWREN - Enabling Realtime Sensor Networks

- ANZA seismic network
  - UCSD SOE Kings Stormwater Bridge
  - UCSB Borrego Valley Downhole Array
- ROADNet
  - Research in multi-disciplinary real-time systems
- GPS
  - Conversion to real time monitoring
HPWREN - NSF MREs

- Network for Earthquake Engineering Simulation
  - UCSD Shake Table
  - UCSB Garner Valley Downhole Array
  - UCSB Wildlife Liquefaction Array

- Earthscope
  - USArray
  - Plate Boundary Observatory

- Ocean Observatories Initiative
  - Coastal Observatories
  - Neptune
  - MOAB - Mother Of All Bouys