Seismic Network Deployment Preparations

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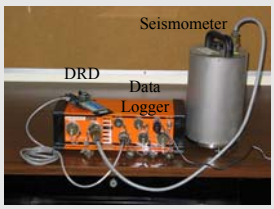
Seismology Group – http://www.cens.ucla.edu/Project-Descriptions/Seismology/index.html

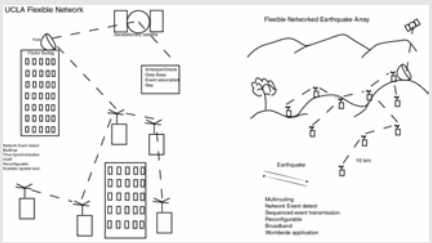
Technology: Array Development & Campus Deployment

Equipment

- **Seismometer**
  - Measures motion *< 0.1 ng* at frequencies from *100 to 0.01Hz*.
- **Data Logger**
  - 24-bit D/A, low power (*<1W*)
- **Data Relay Device (DRD)**
  - Multi-hopping 802.11, local storage, small form factor, local intelligence

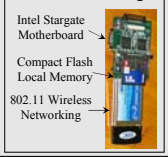


Multi-Hopped Radio Linked Array (MHRLA)



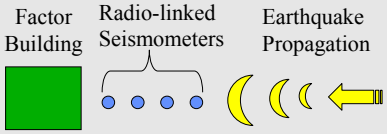
- **Deployments Possible Anywhere**
  - Network timing controlled by DRD, making GPS time at all sites unneccessary
- **Deployments from 100 m to 10 km**
  - Future deployments already planned for UCLA campus and the San Andreas Fault

DRD Closeup



Temporary Campus Array

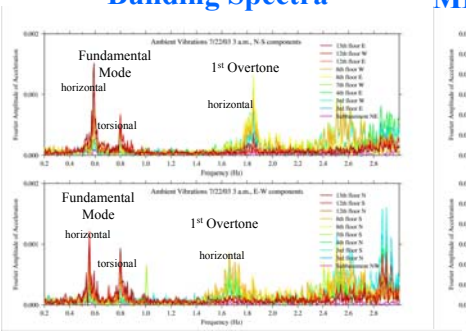
- **Simultaneous Building-Soil Analysis**
- **Observation of Basin Edge Effects on fine scale**
- **Aid in development of robust DRD**



The new Factor data loggers and the UCLA Campus Array installation will allow for wave analysis within the soil and structure.

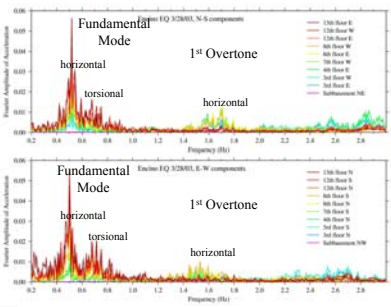
Factor Building Monitoring: Spectral Analysis

Ambient Vibrations Building Spectra



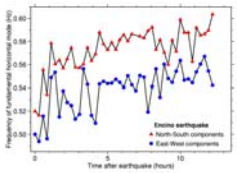
Ambient vibration spectra of horizontal building acceleration recorded during aseismic period on July 22, 2003. The probable fundamental and first overtone peaks are marked.

Building Spectra during the ML=2.9 3/28/03 Encino Earthquake



Spectra of horizontal building acceleration recorded during an earthquake. The probable fundamental and first overtone frequency peaks are marked and appear to be 0.05 to 0.1 Hz lower than those recorded by the ambient vibrations, suggesting small-scale non-linear behavior.

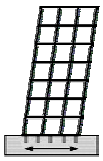
Fundamental Mode Recovery Following Encino Earthquake



Change in fundamental horizontal mode natural frequency after the Encino earthquake.

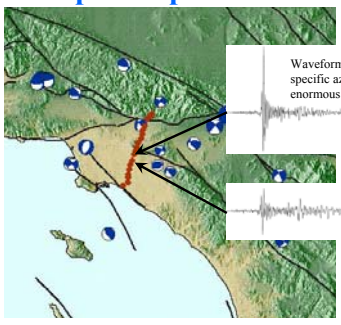
Factor Building Deformation

The Factor building is probably deforming primarily by shear with little evidence of bending, inferred from the frequencies of the modes of deformation and by seismic shear-wave travel times up through the building.

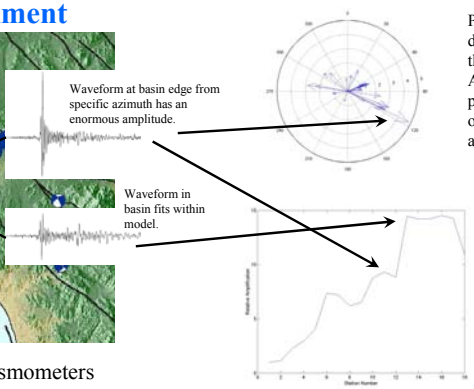


Amplitude Study: Los Angeles Basin Passive Seismic Experiment (LABPSE)

Map of Experiment



Red diamonds are seismometers



Plot of amplitudes from all directions at Station 11 on the edge of the Puente Hills. Amplitudes near 1 are well predicted by model. Extreme outliers come from an azimuth of 116°.

Plot of expected amplification due to soil effects. Notice extremely high amplification from earthquakes coming from 116 °. This added amplification is probably due to the earth acting as a lens, magnifying the wave at depth.

- **LABPSE**
  - Ran in 1997 for 9 months
  - 18 seismic stations
  - All data recorded to on site disks.
- **Model developed for Amplitudes**
  - Magnitude, site, attenuation, and scattering incorporated into the model.
  - Good approximation for most earthquakes.
  - Problems at basin edges from specific azimuths.