SEMINAR

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Title: Semblance based imaging of scatterers in a granite outcrop
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Abstract:

A scattering inversion experiment was conducted on a granite outcrop southeast of Atlanta, Georgia, in order to test a near-surface seismic technique for identifying subsurface fractures and discontinuities in the bedrock. Shallow water-productive fractures in the crystalline and metamorphic rocks underlying expanding suburban and urban areas like Central Georgia have the potential of significantly augmenting surface fresh water supplies. Such fractures are potential scatterers of seismic waves. We conducted the experiment on a granite outcrop in the Panola Mountain Research Watershed. Sixteen vertical high-frequency geophones were placed in a near-circular array with aperture of 15m. A weight-drop source was moved around the array at distances of 10 to 50m. We recorded seismic waves in the range of 100 to 1000Hz. The high frequencies and the lack of overburden suppressed the interference from dispersed surface waves. We used semblance analysis to identify arrivals that were scattered from discontinuities within a 150x150 meter area extending 55 meters below the surface. Semblance coefficients were calculated as a function of time, back-azimuth and apparent velocity. The semblance analysis identified zones of strong surface scatterers that correlate with the surface peculiarities of the field area and the location of a small creek. Scattered P and S waves identified a three dimensional distribution of scatterers. Subsurface scatterers correlate with subsurface geologic features mapped in the area.