

Earthquake Seismology, Exploration Seismology, and Engineering Seismology: How Sweet it is - Listening to the Earth

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Abstract

The seismic method has three areas of application with different requirements for band-width and depth-width: (1) Earthquake seismology with a bandwidth up to 10 Hz and a depth of interest down to 100 km, (2) Exploration seismology with a bandwidth up to 100 Hz and a depth of interest down to 10 km, and (3) Engineering seismology with a bandwidth up to 1000 Hz and a depth of interest down to 1 km. Each of the three categories of seismology makes use of a specific wave type: (1) In earthquake seismology, dispersion of surface waves is used to delineate velocity-depth models for the oceanic and continental crusts. (2) In exploration seismology, reflected and diffracted waves are used to derive an image of the subsurface. (3) In engineering seismology, refracted waves are used to derive a velocity-depth model for the near-surface. I shall present a case study for each of the three categories of seismology: (1) Earthquake seismology case study: A seismic microzonation to determine soil amplification and liquefaction probability within a municipal area; (2) Engineering seismology case study: A site characterization survey to determine P- and S-wave velocities, and delineate geometry of layers within the soil column; (3) Exploration seismology case study: A large-offset seismic survey to image complex structures in thrust belts.