WAVEFIELD SIMULATION NEAR MENDOCINO TRIPLE JUNCTION FROM LOCAL EARTHQUAKES

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Waveforms from subduction zone earthquakes recorded by local stations are natural examples of wave propagation through lateral heterogeneous media. These waveforms carry fruitful information about subduction zone structure. We take advantage of a dense onshore and offshore array near the Mendocino Triple Junction and the abundant seismicity there to study the material properties of the interface of the subducted Gorda plate by comparing forward modeling results with direct observations.

In this study, we focus on two types of phases: multiple converted phases generated by the interaction between direct P or S wave with slab interface and related impedance contrasts as well as “trapped” waves generated by earthquakes happened near the slab interface.

Multiple Ps and Sp phases converted from slab interface are observed between direct P and S waves on the waveform sections. The shape of the converted phases show azimuth and frequency dependences. SPECFEM2D/3D are used to generate synthetic waveforms and to estimate the impedance contrast across the slab interface as well as focal mechanism effects on the converted phase waveforms.

Subduction slab interfaces are usually imaged as a low velocity zone from receiver function or active source seismic studies. This low velocity zone plays an important role in interseismic coupling and earthquake ruptures. The S wave waveforms from the near interface events have much longer durations than earthquakes below or above the slab interface in the same area and have a characteristic frequency. Forward modeling results are used to infer the thickness, velocity reduction and Q value of this low velocity layer.