Full-3D Waveform Tomography for Taiwan Crustal Structure

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The need of a high-resolution crustal model for geological interests and more reliable seismic hazard assessments motivates the implementation of full-3D tomography (F3DT) for Taiwan. Recent results (Lee et al. 2014) have demonstrated the efficacy of F3DT in providing high-resolution models of crustal structure needed for more reliable seismic hazard analysis. Here we report on the progress of our F3DT for Taiwan crustal structure. Our starting model was constructed by a 3D traveltime tomography (Huang et al. 2014). Our F3DT procedure iteratively uses highly optimized staggered-grid finite-difference code to simulate seismic wave propagation through 3D structures, frequency-dependent phase misfit measurements to capture the waveform differences between observed and synthetic waveforms, the scattering integral (SI) method to calculate the Fréchet sensitivity kernels, and a highly optimized LSQR algorithm to solve the linear system (Lee et al. 2014). Our initial inversions have been applied to Rayleigh wave data from the vertical-component ambient-field correlagrams among permanent and temporary stations in our study area. Ambient-field correlagrams allow us to take advantage of the density of seismic networks in Taiwan and they often complement earthquake recordings and can substantially improve the data coverage in our tomographic inversion. Currently, we are in the process of incorporating earthquake waveform data into the inversions.

References

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