論文内容の要旨

論文題目

Methods for waveform inversion for localized seismic structure

(局所的な地球内部構造推定のための波形インバージョン手法)

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In order to fully extract information on localized seismic structure from observed seismic data, we have developed a methodology for seismic waveform inversion. The calculation of synthetic seismograms and their partial derivatives are the key steps in such an inversion. We have developed accurate and efficient methods for calculating broadband synthetic seismograms for spherically symmetric transversely isotropic (TI) media for both shallow and deep events. Synthetics up to 2 Hz are presented, but calculations can be readily extended to higher frequencies, albeit with increased computational requirements. We formulate the inverse problem of waveform inversion for localized structure, computing partial derivatives for the 3-D anisotropic elastic parameters at particular points in space. Our method does not use any great circle approximations in computing the synthetics and their partial derivatives. However, in order to reduce computational requirements, the heterogeneity is treated a perturbation to a spherically symmetric model in the calculations presented in this thesis. Finally, we conduct preliminary waveform inversion for a dataset sampling the D" layer beneath Central America.