

1-D SH models for the mantle transition zone beneath subregions of the Northwestern Pacific obtained using waveform inversion

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Travel-time tomography has contributed significantly to our knowledge of deep-earth structure, as have forward-modeling studies of body-wave waveforms. However, the latter make ad hoc time shifts to align the data and synthetics, and then use subjective visual matching to obtain an Earth model. In this study we develop objective criteria for data selection, so that noisy records or those with a significant misfit can be rejected. We then develop and apply several possible methods for objectively estimating the time shift to be applied. We then invert a waveform dataset from many events and stations to obtain a bestfitting structure model. In this study we use only transverse-component (SH) data. We divide the study region (Northwest Pacific) into four regions and invert for 1-D models of the transition zone in each region. The results are broadly compatible with tomographic studies. The methodology of this study can be extended to invert for 3-D ('pixelized') structure. Before this can be done, however, several issues involved in determining the time-shift must be addressed further.