3-D S-velocity velocity structure in D″obtained by waveform inversion after redetermination of the earthquake source parameters

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Our group previously investigated the 3-D S-velocity structure within the D″ layer beneath central America using waveform inversion (Kawai et al. 2014, GJI; Borgeaud et al. 2016, JPGU). In these studies, the source parameters were fixed to the Global Centroid-Moment-Tensor (GCMT) Project solutions. The GCMT solutions are determined using not only body-waves, but also surface-waves, and mantle-waves, and the data are filtered in a different frequency range from that used in our waveform inversion studies. In this study we redetermine the CMT solutions using body-wave data only, filtered in the same frequency range (12.5-200 s) as that used in our waveform inversion studies. Then, we re-infer the 3-D S-velocity structure of the D″ layer beneath central America using the new CMT solutions. We compare the respective 3-D models to see whether (1) waveform inversion is robust to small changes in the source parameters, and (2) whether the models obtained by waveform inversion are improved by using the redetermined source parameters. We find that the variance reduction for the model inferred using our redetermined CMT solutions is better than that for the model inferred using the GCMT solutions. Also, although this is somewhat subjective, the new 3-D model appears to provide sharper images with a better visualization of paleoslab-like high-velocity structures.

Keywords: Waveform inversion, Earthquake source parameters, Seismic velocity structure of D″

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