

Global Test of Teleseismic Event Locations Using Different Earth Models

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The revised locations in the ISC Bulletin are traditionally based on P-wave travel time tables derived from the radially stratified Jeffreys-Bullen (JB) earth model. Over the last 20 years, however, three-dimensional models of earth structure have been developed that are now generally in agreement at long wavelengths. We have compared hypocentral parameters computed from standard spherically symmetric earth models (JB, PREM, ak135) and lateral heterogeneous 3-dimensional earth models (S&P12/WM13, BSE, HWE etc.).

For our tests, we use a globally distributed selection of events from PIDC ground-truth database, EHB catalogue (Engdahl, Van der Hilst and Buland, BSSA, 1998), 26 explosions tabulated by Smith and Ekstrom (BSSA, 1996) and 82 earthquakes compiled by Kennett and Engdahl (GJI, 1991) for the IASP91 model. We have also investigated the effect of different crustal, ellipticity and elevation corrections.

With the 3-D earth models and teleseismic data from the ISC Bulletin 1964-1997, average original time shifts are smaller and average mislocation of hypocenters from "ground truth" locations are smaller than with any of the 1-D models. Nevertheless, our results suggest that use of regional and local data remains very important in computing accurate hypocenters.

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