

Global Test Of Seismic Event Locations Using Different Earth Models

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In order to update global location procedure with three-dimensional Earth models it is necessary to adequately investigate the effect of different models. We conducted a global test for location accuracy using two different 3-D models and three 1-D models with different distance range of P-phase data. The 3-D models include one spherical harmonic model (SP12) and one irregular grid model (KH07) which are represented in terms of different 3-D model parameterizations. The worldwide distributed events from pIDC ground-truth database, EHB98 catalogue, and well study explosions and earthquakes were selected to perform our global test.

Our study demonstrates clear improvement in event locations over any of the 1-D models (J-B, PREM, ak135). The irregular grid 3-D model KH07 offers the possibility to compute accurate earthquake hypocenters with regional and local phase data, which is very important constraint to location accuracy. It provides the possibility to approach same epicenter accuracy for earthquakes and explosions. Based on the global test, the mislocation distributions of different F-E geographical and seismic regions were summarized, and we found that the error for the high active seismic belts is obviously smaller than other areas. The application comparison for an actual one-month Bulletin clearly displays that 3-D model KH07 improved residuals and location uncertainty compared to those in the ISC Bulletin.