NUMERICAL SOURCE MODELING OF INTERMEDIATE-DEPTH EARTHQUAKES IN SUBDUCTION ZONES

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The physical mechanisms that generate intermediate-depth earthquakes (70-300 km) within subducting slabs are not well understood, because the processes that enable shallow earthquakes are prohibited at extremely high temperatures and pressures. Furthermore, the data available from these earthquakes are scant in comparison to data for shallow earthquakes. Seismological studies of intermediate-depth earthquakes primarily focus on analyzing data assuming a very simple source model, but large intermediate-depth earthquakes have been shown to have complex ruptures. We use the support operator rupture dynamics code (SORD) to obtain more accurate models of the source processes of large intermediate-depth earthquakes, and to calculate stress drop and radiated energy, to compare with source scaling relations determined from small to moderate earthquakes extrapolate to larger magnitudes. We compare results obtained from kinematic and simplified dynamic inversion of the 2001 M6.7 Geiyo earthquake and the 2006 M6.4 Oita-Chubu earthquake in the subducting Philippine Sea Plate, and examine the sensitivity of spectral properties to assumptions about the source, such as whether or not the rupture is crack- or pulse-like. We thus aim to better constrain the physical mechanisms of intermediate-depth earthquakes, and ultimately better assess the hazards of these rare, but often damaging earthquakes.