

The 2004 earthquake offshore of the Kii peninsula, Japan: hypocentral relocation, source process and tectonic implication

Ling Bai[1]; Ichiro Kawasaki[2]

[1] ERI, Univ of Tokyo; [2] DPRI, Kyoto Univ.

On September 5, 2004, two major earthquakes of Mw 7.2 and Mw 7.3 occurred close to the Nankai Trough in southwest Japan. This earthquake sequence is located within the subducting PHS with aftershock distributions that overlapped a portion of the source region of the 1944 Tonankai earthquake (Mw 7.9).

Firstly, we include the sP phases into a widely used double-difference earthquake location algorithm (Waldhauser and Ellsworth, 2000) to improve the accuracy of depth determination for earthquakes with magnitudes around 4.0. Secondly, we relocate events with magnitudes greater than 4.2 by combining a teleseismic single-event location method (Engdahl, Hilst and Buland, 1998) for depth and a multiple-event location method (Jordan and Sverdrup, 1981) for epicenter and origin time. Finally, we employ a waveform modeling method (Kikuchi and Kanamori, 1986, 1991) to constrain source mechanisms and rupture histories of the two major earthquakes. We pay particular attention to the trade-off between the focal depth and the variance of waveform modeling.

All events relocated range between 10 and 33 km, shallower about 20 km than those by the JMA. The Mw 7.2 and the Mw 7.3 events are relocated in the uppermost mantle of the PHS on primary high-angle reverse faults. Focal mechanisms are consistent with the horizontal and vertical projects of the distribution of aftershocks. We speculate this earthquake sequence was due to the collision reaction between the PHS and the Zenisu Ridge.