Lower lomit of seismogenic zone beneath Kinki region based on hyopocenter catalog determined with 3D velocity structure

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1. Introduction

There are many active faults beneath the Kinki region in southwestern Japan, such as the Nojima Fault occurring the 1995 Kobe earthquake. We need the information of the maximum size of the coseismic slip region for the estimation of the maximum size of disaster. We relocate hypocenters with three-dimensional (3D) seismic velocity structure (Matsubara and Obara) and estimate the lower limit of seismogenic zone.

2. Data and Method

We relocated 14371 events from October 2000 to July 2014 within 136.5-139E, 34-36N, and 0-50 km depth with 3D seismic velocity structure (Matsubara and Obara, 2011). We selected events with depths of 0-20 km and 0-25 km to be considered as those related to the active faults. We investigated the index D90 as the lower limits of the seismogenic layer defined as the depth above which 90 % of the whole crustal events occurred from the surface.

3. Result

The D90 along the active faults is almost shallower than 15 km. Extremely shallow regions are northern Hyogo, northern Kyoto, central Wakayama, and central part of the boundary of Nara and Mie. D90 is relatively deep such as 15-20 km on the northeast side of the Yamasaki Fault, beneath the Lake Biwa, and around Ise Bay.

The D90 with events at depths of 0-20 km is almost same as that with events at depths of 0-25 km beneath the Kinki district except the southern Kii peninsula. Almost all of the crustal events occur at depths of 0-20 km here. The Philippine Sea (PHS) plate subducts beneath Kinki region and the upper boundary of the PHS plate exist at 20-25 km beneath the southern Kii peninsula. The events at depths 20-25 km there is related to the subducting PHS plate not the crust of the overriding plate.

4. Discussion

We also calculate the focal mechanism with polarity of P-wave using ray paths with 3D velocity structure. The main mechanism is the strike-slip with EW P-axis and NS T-axis. There is little change of focal

mechanism with the variety of D90. The focal mechanism of events beneath the northern Ise Bay and Mikawa Bay is also strike-slip but with ENE-WSW P-axis and NNW-SSE T-axis.

5. Conclusion

We calculate the D90 as the lower limit of the crustal seismogenic zone beneath the Kinki rregion. D90 is almost shallower than 15 km except beneath the Lake Biwa and Ise Bay. The shallowest region has D90 shallower than 10 km. The focal mechanism of crustal events is almost strike-slip with EW P-axis and NS T-axis.

Keywords: Lower limit of seismogenic zone, Kinki region, D90

