

Seismogenic Layer within the Crust of Japanese Islands on the Japan Sea side using JUICE catalog

*Tomoko Elizabeth Yano¹, Makoto MATSUBARA¹

1. National Research Institute of Earth Science and Disaster Prevention

The width of source faults relate to their size of earthquakes. Understanding the high-resolution seismogenic layer is important parameter for the earthquake hazard assessment because it can estimate the seismogenic width of the particular active faults. Heat flow, geothermal gradient, and D90 (the depth above which 90% of earthquakes occur) are known to correlate with each other. The temperatures for D90 range could evaluate to be between 250°C and 450°C, which falls within the range for defining the seismogenic zone (e.g., Fagereng and Toy, 2011). In this study, we estimated D95 and D05, the depth above which 95% and 5% of earthquakes occur, because more precise and reliable catalog is now available from the Japan Unified High-Resolution Relocated Catalog for Earthquakes (“JUICE” , Yano et al., 2016).

JUICE catalog contains relocated hypocenters for 12 years between 2001 and 2012 from the NIED Hi-net catalog (Depth 40km, 0.0 M). From the JUICE catalog, we extracted events with magnitude equal to or greater than 1.5 in order to satisfy Gutenberg-Richter magnitude-frequency relation. Then we estimated the D95 and D05 depths using the same method as Matsubara and Sato (2015).

The general pattern of our results is consistent with previous studies of D10 and D90 (e.g. Matsubara and Sato, 2015; Tanaka, 2004; Omuralieva et al., 2012). For example, deep D95 lies beneath the northern Hokkaido and northern Honshu and shallow D95 extends along the belt-like volcanic areas. In addition to this general profiles, we can find the local variability of D95 along the active faults. For instance, the northern part of the Kamishiro fault, in the northern Nagano prefecture, has D95 shallower than 15 km while southern part has D95 deeper than 15km. Moreover, this study enables us to compare the seismogenic thickness and the actual crustal seismicity along the particular faults such as the 2014 North Nagano and the 2016 Central Tottori earthquakes. In our presentation, we will show the D95 and D05 depths on both general and local profile along the particular faults.

Figure 1: Map of D95 on the Japan Sea Side inferred by the JUICE catalog. Our study region is indicated in colored background. Gray area is where number of events is insufficient in order to estimate D95.

Keywords: Seismicity, Seismogenic layer, Crust, Hypocenter relocation

