Linear distribution of the intraslab earthquakes in Tokai

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Figure 1 show an epicenter map of the earthquakes shallower than 60 km in the Tokai area occurring from June 2002 to April 2018. The intraslab earthquakes were shown by yellow, green, or blue small circles, because they occurred in the depth from 30 –50 km. They distribute not homogeneously but linearly as shown in the epicenter map. Elongated ellipses by broken lines show linear distributions (LDs) of the intraslab earthquakes. LD-A and LD-d arranged NW-SE are main distribution in the Tokai area. On the east of them there are small LD-e and LD-f. In contrast LD-B which is arranged NNE from near the port of Nagoya makes an angle of 70° with LD-A. There is small LD-c on the west of LD-B. LD-B and LD-c may be suggested by Miyoshi and Obara (2010a). We studied focal mechanism solutions of 12 earthquakes (Group A) belonging to LD-A and 146 earthquakes (Group B) belonging to LD-B, respectively, using JMA data. We obtained the average values of the azimuths of P- and T-axis for each group as the following. The average values for Group A are 171° and 350° in P-axes and 91° and 256° in T-axes, respectively (see Figure 1). The average values for Group B are 172° and 358° in P-axes and 82° and 254° in T-axes, respectively (see Figure 1). There are no large differences in their corresponding values between Group A and B. This result suggests that there is no large difference in the average stress generating earthquakes between Group A and B. We, therefore, have to consider other reasons for causing those linear distributions.

Figure 2 is a seismological cross section that crosses the Tokai area from NNW to SSE referred from Suzuki et al., 2018. Schematic interpretation of seismic structures including S wave tomography (Nakajima and Hasegawa, 2016) and two earthquake groups consisiting of LFEs and intraslab earthquakes are represented. The most of intraslab earthquakes distributes in the low velocity area of *S* wave in the uppermost oceanic mantle. The relatively low velocities of *S* wave in the subducting oceanic crust and its surrounding areas are interpreted as being indicative of fluids released by progressive metamorphic dehydration reactions in the oceanic crust (e.g., Abers et al., 2013) under increasing temperature and pressure conditions. We suppose that the intraslab earthquakes occur because these fluids penetrate into the uppermost oceanic mantle. Therefore the pore fluids may penetrate from the oceanic crust into not homogeneously but linearly in plane. It is presumed that old fracture zones that had been formed before the Philippine Sea plate subducted below the Tokai area existed at the uppermost oceanic mantle.

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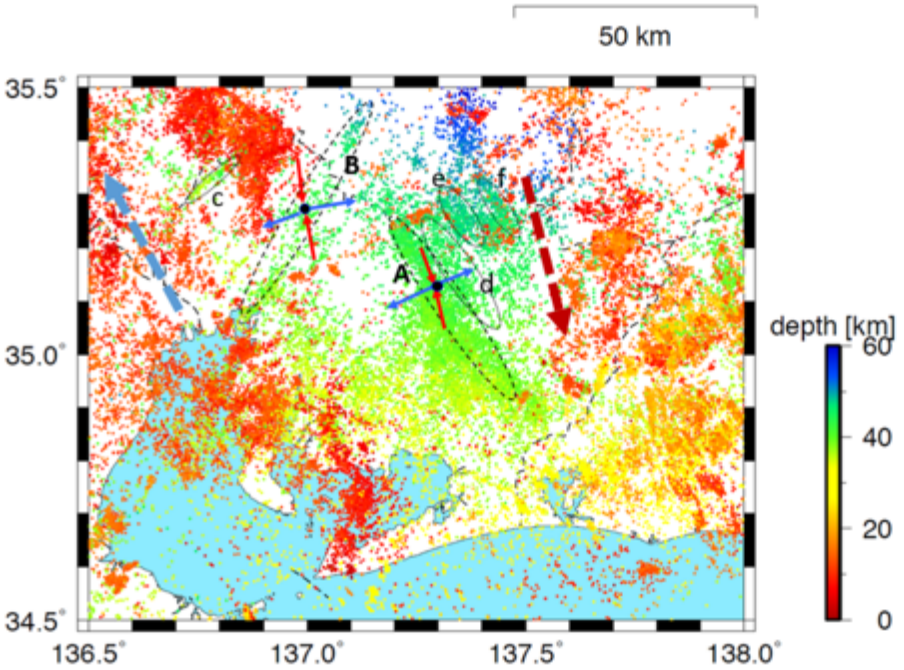

Figure 1. Epicenter map (presented by Osamu Murakami) of the earthquakes shallower than 60 km in the Tokai area occurring from June 2002 to April 2018 (JMA data). Elongated ellipses by broken lines show linear distributions of the intraslab earthquakes. Red and blue allows indicate P-axes and T-axes, respectively. A brown and blue broken lines show the ridge and valley of the slab shape (Hirose et al., 2008), respectively

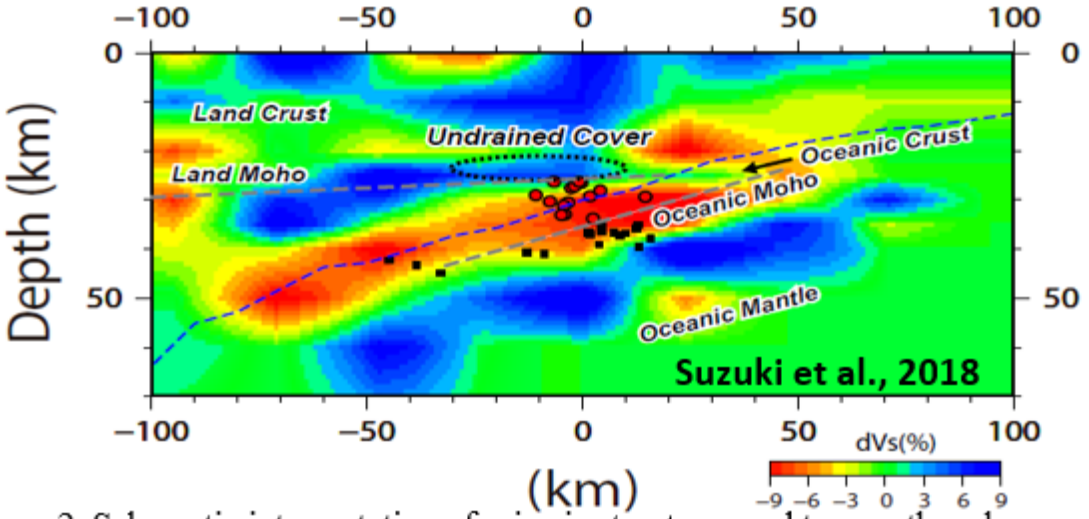

Figure 2. Schematic interpretation of seismic structures and two earthquake groups consisiting of LFEs (red circles) and intraslab earthquakes (black squares) referred from Suzuki et al., 2018.

