

## Generation process of the deep low-frequency earthquake beneath Mt. Iwate inferred from precise relocation and seismic tomography

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It is well known that deep low-frequency earthquakes (DLFEs) with dominant frequency of 2 to 4Hz occur at depths from 30 to 40km in volcanic areas, NE Japan (Hasegawa and Yamamoto, 1994; Okada et al., 2000). In addition, it has been pointed out that the source mechanism of DLFEs consist of the DC and non-DC components by moment tensor inversion (Okada et al., 2000; Nakamichi et al., 2003). These observations suggest that source mechanism of DLFEs is possibly related with the fluid (or magma). In this study, we relocate the DLFEs and determine the 3-D seismic velocity structure around the hypocentral region beneath Mt. Iwate, NE Japan where the DLFEs frequently occur, and discuss on the generation mechanism of DLFEs.

We applied DD-Tomography method (Zhang and Thurber, 2003) to data obtained by the seismic networks of Tohoku University and NIED. Total number of events is 3690. We performed two procedures: one is only the relocation and the other is the simultaneous inversion for relocation and velocity structure determination. Note that to consider the vertical velocity gradient in vertical direction in and around the Moho, the grid size is set to be 5km in horizontal direction and 1km in perpendicular direction. We referred Nakajima et al.(2001) for the initial velocity structure.

As a result, two clusters of the DLFEs are more concentrated in the southern and the northeastern areas of Mt Iwate. Most of them also seem to be concentrated in a few km shallower than the Moho and just above a zone with high  $V_p/V_s$  value (about 1.8 or greater), probably a zone of partial melting (Nakajima et al., 2001). This tendency seems to be more certain from the comparison of the locations of DLFEs with the velocity structure estimated by this study.

The present result suggests that the DLFEs are not distributed within the partial melting zone, but just above it. Thus, the water discharged from the partial melt might be related with the generation process of DLFEs (Hasegawa et al., 2006).