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Reinterpretation of the lithospheric structure beneath the Hidaka collision zone, Hokkaido, Japan 1.Outline

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An arc-arc type collision between the northeastern (NE) Japan arc and the Kuril arc has formed Hidaka collision zone (HCZ) in south-central Hokkaido Japan. From detailed geologic information, it is known that Kuril arc crust is thrusting westward on the NE Japan arc along the Hidaka Main Thrust (HMT).

To clarify the subsurface structure of the deeper part, several reflection/refraction surveys across the HCZ were carried out in the period from 1994 to 2000 by the group of University of Tokyo, Hokkaido University and Chiba University(e.g. Arita et al., 1998; Tsumura et al., 1999; Ito et al., 2002, Iwasaki et al. 2004). The seismic profiles reveal that distinct east-dipping reflectors are dominant in the eastern side of the HMT. Especially, in the Hidaka94-97 transects, the upper portion of the Kuril lower crust is characterized by numerous east-dipping reflectors, whereas west-dipping reflectors dominate the lower part of the lower crust. From this reflector configuration, the lower crust of the Kuril arc is interpreted to be delaminated by the collision.

Recent results of travel time tomography showed that the existence of east-dipping high velocity zone at the eastern side of the HMT and low velocity zone intruded beneath the high velocity zone. These velocity images well coincide with the feature seen in the reflection profiles in the shallower part. However, it seems that there are some disagreements between velocity images and reflection profiles in the deeper part. Since it was difficult to argue rock composition only from the estimated velocities or from reflection events, we examined to detect reflectors at the deeper extension of lower part of the lower crust by using multi-dip reflection surface (MDRS) method(Aoki et al.,2010). MDRS analysis is an effective tool to emphasize the weak dipping reflections and it provides us new information about a deeper part beneath the HCZ.

Keywords: Hidaka collision zone, delamination, seismic reflection survey, travel time tomography