Arc-Arc Collision Structure in the Southernmost Part of the Kuril Trench Region -Overview of Results from Integrated Renalyses for Controlled Source Seismiata in the Hidaka Collision Zone-

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The southernmost part of the Kuril trench is known as an arc-arc collision zone. Since the middle of the Miocene, the Kuril forearc has been colliding against the NE Japan arc to form very complicated and unique tectonic environment in the middle part of the Hokkaido Island (the Hidaka Collision Zone (HCZ)). In this region, several seismic reflection/refraction experiments were undertaken (Arita et al., 1998; Tsumura et al., 1999; Ito et al., 2000, Iwasaki et al., 2004). Our integrated reinterpretation for these data sets, which started in 2012, revealed detailed and new structural features and their regional difference within the HCZ.
In the southern part of the HCZ, the crustal delamination associated with the collision was clearly imaged by applying CRS/MDRS method to the seismic reflection data (Tsumura et al., 2014). Namely, the upper 22-23 km crust of the Kuril arc is off-scrapped and obducted along the Hidaka Main Thrust (HMT), while the lower part of the crust is descending down to reach the subducted Pacific plate.
In the northern part of the HCZ, the HMT is also well imaged both by seismic reflection processing and refraction/wide-angle reflection analysis, but the delamination structure as obtained in the southern HCZ is not clearly seen. Around the HMT, the crystalline basement is almost outcropped. In the west of the HMT, several eastward dipping layering is found down to a depth of 7-8 km, probably corresponding to fragments of Cretaceous subduction/arc complexes or deformation interfaces branched from the HMT. The relatively higher velocity in the uppermost crust just east of the HMT represents the base of the obducted middle or (upper part of) lower crust of Kuril arc. The upper crustal structure in the hinterland (the Tokachi Basin) is characterized by 5-7 km thick undulated sedimentary layers which were deformed by faulting in some places.
The most important finding in the northern HCZ is a clear image of the NE Japan arc crust descending eastward to a depth of about 40 km under the hinterland side. Our refraction/wide-angle reflection analysis revealed the very complicated structure above the descending NE Japan arc. Strong dipping reflectors with a velocity contrast of 0.5-1 km/s are distributed in a depth range of 10-35 km in the HCZ west of the HMT. Our result shows that the subducted NE Japan arc meets the Kuril arc 20-40 km east of the HMT at a depth of 20-30 km. Although the Moho of the Kuril arc is not determined, our data provide no evidence for a shallow Moho (< 30 km) as indicated by tomography studies.
The obduction of the upper Kuril crust starts at a deeper crustal level of at least 27-30 km and more easterly (~20 km) of the HMT as compared with the case in the southern HCZ. If the metamorphic rocks outcropped east of the HMT are the same crustal materials shallower than 22-23 km depth as in the case of the southern HCZ, the deeper crustal portion originally situated at 23-27~30 km depth must exist in the western side of the present HMT. The very strong and deep reflectors found west of the HMT might result from the mixture of upper crustal (low velocity) materials of the NE Japan arc and middle/lower crustal (high velocity) materials of the Kuril arc.

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