

Seismic structure beneath the Hidaka Collision Zone, Hokkaido, Japan estimated from receiver function analysis

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Hidaka mountain range has been formed by arc-arc collision. Seismic reflection surveys were carried out in this area and deep seismic profiles were obtained. These profiles revealed that due to the arc-arc-collision, delamination - wedge structure has been formed beneath the Hidaka collision zone (Tsumura et al., 1999; Ito et al., 2000).

However reflection events were not always continuous or clear, so we examine to detect the subsurface boundary by receiver function analysis which detects converted phases from 3-component seismic records.

First we made temporary seismic observation in the southern part of Hidaka collision zone where seismic reflection survey was carried out. The period of the temporary seismic observation is from September 3 to September 23, 2000. We arranged 7 seismic stations in the direction of SW-NE and the interval of these stations is about 3km. Seismic data were recorded continuously by DAT recorders. We cut out the teleseismic events from the data and applied the low pass filter to remove high frequency noise. Next by dividing the spectra of radial component which are synthesized from 2 horizontal component waveforms with the spectra of vertical component, we get receiver function for each data.

For 6 events, we found several distinctive phases that are seen 0.9s, 3.7-8s, 6.0-2s after P arrivals in the receiver function. These phases are considered to be P to S converted phases beneath the stations because waves which are converted near source region reach the stations much later than these phases. Then we estimate the conversion depths of these phases using seismic velocity structure which were determined by Moriya et al.(1998) beneath the Hidaka collision zone. The estimated conversion depths are 7-8km, 29-30km, 48-50km, respectively. From the reflection profiles that were carried out in the same region suggest that; 1) the shallowest conversion points(7-8km) and deepest conversion points(48-50km) correspond with the base of the Ido-nap Belt and the upper boundary of the subducting Pacific plate, respectively. The conversion points around 30km is located in the intruded northeastern Japan arc and its origin are not clear, however, since we can see some tentative reflection events in the same depths of reflection profiles, there might be any impedance contrast in the depths around 30km.