Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SCG72-P09 Room:Convention Hall Time:May 22 17:15-18:30

Seismic attenuation structure beneath the Hokkaido corner: Imaging the arc-arc collision process

KITA, Saeko[1*], HADA, Shuhei[1], SHIKASHO, Kenta[1], NAKAJIMA, Junichi[1], HASEGAWA, Akira[1], KATSUMATA, Kei[2]

[1]RCPEV, Tohoku University, [2]Institute of Seismology and Volcanology, Hokkaido University

1. Intruduction

In the Hokkaido corner, the Kuril forearc sliver collides with the northeastern Japan arc. Using data from the nationwide Kiban seismic network and temporary seismic network, we determined high resolution three-dimensional seismic velocity structure beneath this area to understand the collision process between the Kuril and NE Japan forearcs [Kita et al., 2010, EPSL; 2011, AGU Fall Meeting], which revealed that an anomalously low-V zone (crust material) descends into the mantle wedge area and reaches a depth of ˜80 km immediately above the subducting Pacific slab. Many earthquakes also occur in this low-V zone down to -80 km depths. In order for deeper understanding of the collision process, we estimated three-dimensional seismic attenuation structure beneath the Hokkaido corner and compared the obtained seismic attenuation images with the seismic velocity images of Kita et al. [2011].

2. Data and method

We applied the methods of Eberhart-Phillips and Chadwick (2002) and Hada et al. (2010, 2010 JPGU meeting) to seismic waveform data from the Kiban network. We simultaneously determined a value of $t*$, corner frequency, and amplitude level for the calculated spectra. Then, seismic attenuation structure (Q value structure) is imaged using $t*$ values. The study region is 41-45N, 140.5-145E, and a depth range of 0-200 km. We obtained 5721 P-wave and 3579 S-wave spectra from 723 events ($M>2.5$) that occurred in the period from October 2006 to April 2011. Horizontal and vertical grid nodes were set with a spacing of 0.10 degree and 10-30 km, respectively.

3. Result

Obtained images show that low-Q zone are located at depths of 0-60 km beneath the western area of the Hidaka mountain range, whereas the eastern area of it (Kuril forearc) has very high-Q values. The low-Q zone almost corresponds to the low-V zone by Kita et al. [2011]. Western portion of the low-Q zone has relatively lower Q values, where inland-type deep seismicity is active. The fault plane of the 1982 M6.7 Urakawa-Oki earthquake is also located on the edge of the lowest Q portion. These results imply that the occurrence of anomalously deep depth earthquakes in this region is related with spatial distribution of hydrous minerals or fluids.

Keywords: Seismic attenuation structure, Arc-arc collision zone, Geofluids, 1982 M6.7 Urakawa-oki earthquake