Strong motion distribution from an earthquake of off Shakotan peninsula area derived from 3-D Q structure beneath Hokkaido

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We have found that Low-Q distribution is very different between the depth of 0-30km and 30-60km beneath Hokkaido district (Nakamura et al. 2006). The Low-Q distribution in the depth of 30-60km is concordant with the volcanic front. In the depth of 0-30km, the distribution of Low-Q is coincident with the Kamui-Kotan metamorphic belt of north-south trend in Hokkaido central axis.

Hisamoto(1977) studied seismic intensity distributions in Hokkaido from the remarkable earthquakes occurred from 1951 to 1960. He pointed out that the felt area of the Shakotan-Hanto-Oki earthquake of 1959(M6.2, H=10km) is clearly different from those of earthquakes occurred in Pacific Ocean. The felt area of former event was restricted in west side of the central line of Hokkaido that is from the cape Erimo to the cape Soya, although the seismic intensity of latter events decreased steeply across the east-west line that corresponds to the volcanic front of Hokkaido.

We can interpret this phenomenon as the effects of 3-D Q structures beneath the Hokkaido area. The seismic waves from the earthquakes occurring along the subduction of the Pacific Ocean plate are passing across upper mantle and are strongly attenuated in the Low-Q belt beneath the volcanic front. The seismic waves from the Shakotan-Hanto-Oki earthquake pass through the crust of 0-30km and are strongly attenuated in the Low Q belt of the north-south axis of Hokkaido.

To make sure of this idea, we simulated the ground motion distribution of the Shakotan-Hanto-Oki earthquake by using 3-D Q structure model of Nakamura et al. (2006). For calculation of ground motions, we adopted the source spectral model of Boore (1983) used as initial value in inversion analysis of Nakamura et al.(2006) and other parameters were the same as the inversion analysis.

The result of simulation (fig.1) explains Hisamoto's indication well. This result indicates that the 3-D Q structure strongly affected the distribution pattern of seismic intensity.

REFFERENCE

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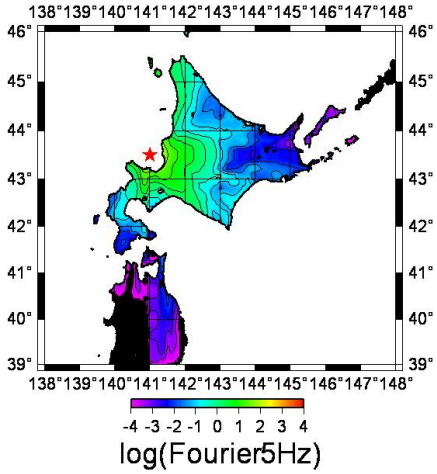

図－1　積丹半島沖の浅発地震による地震動予測結果
東経141.0度　北緯43.5度　深さ0kmにM6.2の地震を想定