S152-P008 **Room: Poster Session Hall** **Time: May 23**

Detection of high attenuation zones in the crust and mantle of the Tohoku District based on the characteristics of waveform data

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1. Introduction

3D attenuation structure in the Tohoku District has been investigated by an inversion of P-wave amplitude (Tsumura et al.,2004) and attenuation zones were found beneath active volcanoes. In the inversion analysis, small size (less than 10km) anomalies may be difficult to detect. A region with very high attenuation may also be unrecognized, because low S/N data such as highly attenuated arrivals are excluded in the analysis. In order to find a small size, high attenuation zone, tracing ray paths of decayed S wave arrivals are very effective (e.g. Horiuchi et al.,1997). In the present study, we mapped high attenuation zones in the crust and mantle of the Tohoku District by using characteristics of S-wave arrivals and ray paths.

2. Data

Data are S-waves from about 450 earthquakes with M greater than 2 which occurred below 80km in the land area of the Tohoku District during Jun 2002-Sep. 2005. We collected waveforms recorded by 157 Hi-net, JMA and Tohoku University stations within an epicentral distance of 100km.

3. Characteristics of S-wave forms

As a whole, a short period component is dominant at stations east to the volcanic front, while longer component is dominant to the west. Waves arriving from the direction of volcanoes tend to decay. Amplitudes and dominant periods vary according to arrival direction. We calculated the amplitude energy ratio of a direct S-wave to coda waves in the following manner, and compared the ratio with S-wave feature observed.

1) Automatically pick-up P-wave arrivals and calculate S-wave arrival times assuming Vp/Vs=1.73.

2) Correct calculated S-wave arrival time if it is obviously different from observation by more than 1.0s.

3) Multiply S-wave energy by the correction (ts/t0)^2*exp[2PI*(ts-t0)/Qs)] for compensating decay by geometrical spreading and 1/Qs effects, where ts is S-wave travel time, t0 and Qs are assumed to be 35s and 350, respectively. S-wave energy is the mean-square of amplitude during 2s after S-wave arrival.

4) Calculate ratio of compensated S-wave energy to coda wave energy to remove effects of source magnitude and station characteristics. Coda wave energy is obtained using the coda part with lapse time of 60s.

During this procedure, we excluded records if S-wave or coda energy was smaller than noise level. S-wave arrivals with the ratio less than 2 are almost invisible. Therefore we regard waves highly attenuated, if the ratio is less than 2.

4. Mapping high attenuation zones

We mapped high attenuation zones as follows. Location of a point where a ray path intersects a horizontal plane of various depths is calculated in a 2D structure containing Moho and a subducting plate boundary. A horizontal plane is divided into 0.1deg by 0.1deg regions, regions where number of crossing ray paths is larger than 10 and proportion of ray paths with energy ratio less than 2 is larger than 80% are displayed on a map.

Distribution of high attenuation regions corresponds to Quaternary volcanoes. It also corresponds to the result by an inversion. However, horizontal extent of an attenuation zone in a direction perpendicular to the volcanic front is narrower in the present study. The zone continues to depth of 70km near Iwate-san Kurikoma-yama and Zao-san, and 90km near Azuma-san.

Acknowledgement

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References

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