Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS26-P08 Room:Convention Hall Time:May 26 18:15-19:30

Separation of scattering loss and intrinsic absorption under Tateyama volcano

IWATA, Koji[1*] ; KAWAKATA, Hironori[1] ; DOI, Issei[2]

[1]Ritsumeikan Univ., [2]DPRI, Kyoto Univ.

Tateyama volcano (Midagahara volcano) locates in southeastern part of Toyama prefecture. The volcanic activity of Tateyama volcano is quite low. Previous studies have suggested a low-Q zone beneath the region near Tateyama volcano. Katsumata et al. (1995) studied in more detail and suggested the presence of regions with low-velocity and low-density as well as low Q anomaly near Tateyama volcano.

Iwata et al. (2014) estimated S wave attenuation beneath Tateyama volcano using twofold spectrum ratios, and suggested that regions with high seismic attenuation exist in the southern or the southeastern region of Tateyama volcano. Q parameters in these regions were estimated to be around 50-200.

There are well-known two key factors which characterize seismic wave attenuation: scattering loss and intrinsic absorption. Scattering loss is caused when seismic waves are scattered by crustal heterogeneity. On the other hand, intrinsic absorption is considered to be due to the fact that energy of the seismic waves mainly changes into frictional heat energy along their paths. Magma chambers can make scattering loss and intrinsic absorption strong in volcanic regions. In this study, we investigated the scattering loss and intrinsic absorption in localized volcanic region, beneath Tateyama volcano.

The relative contribution by scattering loss and intrinsic absorption in the seismic waves changes with the lapse time. Due to scattering effect, the direct waves decay and coda waves are generated. Therefore, a part of the energy of the direct waves from the seismic sources is distributed among coda waves, but total energy is maintained constant. On the other hand, intrinsic absorption makes the total energy of the entire seismic wave lowered.

The Multiple Lapse Time Window Analysis (MLTWA) is often used to estimate scattering loss parameter, and intrinsic absorption parameter, at the same time (e.g., Fehler et al., 1992; Hoshiba, 1993; Carcole and Sato, 2009). We used this method and compared the seismic energy integrated over the time windows and the one which is derived from an approximate analytic expression (Paasschens, 1997). After trial and error, we found suitable scattering loss and intrinsic absorption values.

We used seismograms at five Hi-net stations near Tateyama volcano for nineteen small, local earthquakes (M 2.5-4.0) that occurred from January 2012 to December 2013.

We considered the following frequency bands: 1-2, 2-4, 4-8 and 8-16 Hz. We used the normalized mean square amplitude after S wave arrival time.

Previous researches that applied MLTWA used three 15 s time windows from the direct S time, but we take different time windows which is more appropriate for the used data. In addition, we consider the effect of the error in estimation of S wave arrival time.

Acknowledgments:

We are grateful to those who have made continuous efforts to run and maintain the Hi-net and its database. Our appreciation also goes to those who have made continuous efforts to develop JMA unified hypocenter catalog.

Keywords: Tateyama volcano, Scattering loss, Intrinsic absorption, MLTWA