Analysis of explosion seismic wave data by true amplitude display

mio Shimoyama[1], Akiko Hasemi[2]

[1] Yamagata Univ., [2] Earth and Environ. Sci., Yamagata-Univ.

In this study, In order to analyze waveform data, I made corrections of site amplification factors and read travel times of later phases, then discussed the structure beneath the profile. Results of this study are as follows; There is a close relation between site amplification factor and surface geology; Travel times of later phases that were considered to be reflections from the Moho could be read at the stations near the shot point; At Kirtakami range, there are a lot of later phases, but at the west of Ou Backbone range, there are few later phases.

In order to obtain velocity structure using the data from an explosion seismic profile, we must read travel time of initial motions and later phases such as refractions and reflections. Basically, amplitude of reflections from a deep reflector is the same among nearby stations, and this makes it easier to identify reflections. In practice, however, the later phases of each station have different amplitudes due to different site amplification factors. So we need to obtain site amplifications and correct each wave amplitude by that amplification factor.

Explosion seismic observation experiment was carried out as a part of the 1997 Joint Seismic Observation and Prospecting Project in Tohoku, NE Japan. By correcting amplitude using site amplification factors, later phases became clearer. In order to analyze waveform data interactively on a graphic display, a computer program was developed. Using this program, travel times of later phases were read, and then discussed the structure beneath the profile.

Site amplification factors were obtained using coda wave amplitude of the stations that epicentral distances are within 20 kilometers. There is a close relation between site amplification factor and surface geology. Generally, granitic sites have large amplifications and at sedimentary sites it decreases with increasing geologic age.

Using this program, a series of later phases and whole energy flows can be recognized. And, Travel times of later phases that were considered to be reflections from the Moho could be read at the stations within 20 kilometers from the shot point. At Kirtakami range (shotL1 and L2), there are a lot of later phases, but at the west of Ou Backbone range, there are few later phases.