Analysis of seismic ACROSS data acquired by detection of transmitted waves from the Morimach

Yasuhiro Yoshida[1]; Akio Katsumata[2]; Kazuhiro Iwakiri[1]; Takahiro Kunitomo[3]; Mineo Kumazawa[4]; toshiaki masuda[5]

[1] MRI; [2] Meteorological Research Institute, JMA; [3] Shizuoka Univ.; [4] Geosci., Shizuoka Univ.; [5] Inst. Geosci., Shizuoka Univ.

A new seismic ACROSS transmitter was installed at Morimachi in the western Shizuoka prefecture March, 2006 by MRI. The transmitting station has been regulated by repeated test operations since right after installation, and the tests of routine transmission have been started from August, 2006. Here we introduce the some results obtained so far by using routinely operated Hi-net and JMA seismic stations.

The main feature of the new transmitter is larger energy of transmitted seismic waves at low frequency, in particular, by choosing an optional addition of a large eccentric mass for rotor. We have two different types of operation [LF] and [HF]: [LF] is for low frequency operation with a carrier frequency of 5.510Hz and FM band of 3.5-7.5Hz and [HF] is high frequency operation with a carrier frequency of 11.510Hz and FM band of 7.5-15Hz. The [LF] modulation period is taken 50 seconds and the generated average force is ~10^5 N in the both cases. All of these signal specifications follow the transmission protocol proposed by Kunitomo [2006] for seismic ACROSS.

The time segments of 200 sec data acquired are stacked at each of Hi-net and JMA stations for 137 days in [LF] and for 29 days in [HF]. Stations less than 100 km in distance were used in this analysis. The data were stacked with the weight in reciprocal proportion to the data variance defined in each of the time segments.

The signal level was roughly inversely proportional to the distance. The signal level for stations in NW direction was relatively larger than that in another direction. This might correspond to the large coda amplitude after arriving S wave.

The transfer function from the ACROSS transmitter as a wave source to the observation site was computed by the ratio of the observed signal (m/s) to the excited force (N) in frequency domain. It is Fourier-transformed to obtain the corresponding Green function defined only within the frequency range specified by the FM band.

The characteristics of record section are different for different azimuth of the observation site referred from the source. Large coda after arriving S wave was observed on record section in NW direction. A clear reflection phase from the upper boundary of the Philippine Sea plate was observed in seismic profiling experiment with explosion sources was conducted in this region in 2001 [Iidaka et al., 2006]. Ray tracing using laterally heterogeneous velocity structure model has shown that the arrival time of this coda is roughly corresponded to that of reflection phase from the upper boundary of Philippine Sea plate. We noted a significant frequency dependence as well as azimuth dependence of polarization, incident vector, and waveforms in the data acquired and analyzed. Such a characteristic feature of the transfer function data acquired by ACROSS surely carries a very large amount of information, that could not be obtained so far on the various types of heterogeneity within the Earth's crust.

Acknowledgment
We used Hi-net data in this analysis.