

Observations of the transfer function by EM-ACROSS in Tono area

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We have developed and tested an electromagnetic sounding method, which is called EM-ACROSS (ElectroMagnetic-Accurately Controlled Routinely Operated Signal System). The essential points of this method are : (1) use of very accurately controlled periodic electromagnetic waves, (2) precise synchronization of observation systems to the source signal, and thereby (3) obtaining the transfer function with a high S/N in frequency domain by means of a long period stacking.

We have tested a prototype system at Tono area using the GPS clock for synchronization. We transmitted the source signal from the grounded wire (dipole length : 100m). We used a set of line spectrum below 150Hz as the source signal. We observed magnetic and electric field in the tunnel managed by Nagoya University, which is 2.4km apart from the source. The S/N of the observed transfer function is about 50 after the stacking for 1 week. From the frequency dependencies of the transfer function the information of the underground structure is extracted out. We can estimate that the travel time of the tested frequency range is about 2msec. We also observed that the temporal variations of the transfer function of each transmitted frequency, which has the information of different region of the ground.

We have demonstrated that EM-ACROSS is a potential methodology for the temporal variations of the underground structures.