

Long-Term Operation Test of the EM-ACROSS toward an Electromagnetic Active Monitoring of the Earth's Lithosphere

Hiromichi Nagao[1]; Takahiro Nakajima[1]; Takahiro Kunitomo[1]; Junzo Kasahara[1]; Mineo Kumazawa[1]; Toshiyasu Nagao[2]; Keizo Sayanagi[3]; Yoichi Noda[2]; Makoto Harada[2]

[1] JNC Tono; [2] Earthquake Prediction Res. Center, Tokai Univ.; [3] IORD, Tokai Univ

Accurately Controlled Routinely Operated Signal System (ACROSS), which is a new exploration method for underground structures using a controlled seismic or electromagnetic source, has been operated in Tono, Gifu, Japan since 2002 toward a dynamic and active monitoring of the Earth's lithosphere. In a long-term operation test of the electromagnetic ACROSS, a set of sinusoidal sources having frequencies of 0.9275, 1.2500, and 1.5625Hz are transmitted continuously from Tono mine in Toki City, and we have carried out the observations using fluxgate magnetometers at four stations located from 1km to 50km from the source. The obtained magnetic data were divided into time segments of 400 seconds, and they were successively stacked in the frequency domain using an optimum weighted stacking method. The transmitted signals are detected at two nearest observatories with a large signal-to-noise ratio (SNR) though the SNR is 4 at maximum at the remained two observatories. For the purpose of a more reduction of the noise level, we propose a statistical model for a spike noise elimination that consists of two components; one is a spike component and another is a noise component that follows a normal distribution function. The number of spikes included in data is determined by the Akaike Information Criterion (AIC). This model is applied to synthetic and real magnetic data, and it is confirmed that obvious spikes in data can be removed with this method.