

Weighted Stacking Method for Received Signals in ACROSS system

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Accurately Controlled Routinely Operated Signal System (ACROSS) is such a new sounding and monitoring method for the underground structures that is organized to be robust against noise. A controlled signal with a set of line spectrum is transmitted from a source on the ground, the propagated signals are recorded by a receiver, and the transfer function from the source to the receiver is determined. Received signals are stacked to increase the signal to noise ratio (SNR) of the transfer function. The purpose of the present work is to devise an optimum method of data stacking to obtain the highest SNR even the noise level changes with time. The theoretically best one appears to be the stacking with the weight in inverse proportion to the frequency-dependent noise power. We applied this weighted stacking method to the synthetic data and the real electromagnetic data obtained at the test site (Tono, Gifu Prefecture, Japan), and concluded that the SNR obtained from the weighted stacking method is better than those obtained from other methods having been used so far.