

Processing of magnetotelluric time series data with Effective noise separation using a frequency domainin

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Abstract

Magnetotelluric (MT) response function estimates can be severely disturbed by the effects of cultural noise. Methods to isolate and remove these disturbances are typically based on time-series editing, robust statistics, remote reference processing, or some combination of the above. Robust remote reference processing can improve the data quality at a local site, but only if synchronous recordings of at least one additional site are available and if electromagnetic noise between these sites is uncorrelated. If these prerequisites are not met, we suggest an alternative approach for noise removal, based on a combination of frequency domain editing with subsequent single site robust processing. The data pre-selection relies on a thorough visual inspection of a variety of statistical parameters such as spectral power densities, coherences, the distribution of response functions and their errors, etc. Extreme outliers and particularly noisy data segments are excluded from further data processing by setting threshold values for individual parameters. This study is based on Fast Fourier Transform (FFT) and mainly focuses on the behaviour of different processing parameters, their interrelations and the influences of different processing methods concerning improvement of the S/N ratio of noisy data. Our study suggests that no single processing approach can give desirable transfer functions, however combination of different processing approaches may be adopted while processing culturally affected noisy data.

Reference

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