IMPROVING MAGNETOTELLURIC TRANSFER FUNCTIONS' QUALITY BY INCLUDING KNOWN DISTURBING SIGNALS TO THE PROCESSING

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In many situations, the magnetotellurics faces the need to deal with data containing a more or less extensive part of noise that diminishes the quality of transfer functions obtained from such data. There are many methods to minimize or suppress that bad influence of noise before and during the processing, e. g. selection and the remote reference technique.
In this contribution, we present an additional approach to deal with noise (or disturbing signals, respectively) for cases where a dominant part of that noise is relatively well known, i. e. if time series of its source are available. If a linear relationship between this disturbing source and its effect on the time series measured at the magnetotelluric station can be assumed, then this source can simply be regarded as an additional input variable to the linear regression which makes up the processing.
We demonstrate our method by two examples, the first one being magnetotelluric data measured at the Danish Geomagnetic Observatory Brorfelde, where near-by high-voltage DC power lines leave their traces in the data, and the current flowing through the cables at a given time is known. Second, we consider data from two types of magnetic and magnetotelluric marine instruments, where the disturbances are caused by oscillating movements of the instrument due to surface waves, and this movement is recorded by inclinometers.
In all cases taking into account the "noise" led to a significant improvement of transfer functions compared to applying the remote reference technique alone. Furthermore, the additional transfer functions obtained between the "noise" and the magnetotelluric data give some hints on why non-complex correction methods for such kinds of disturbances are sometimes less successful.

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