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# A Heuristic Method to Process Marine Magnetotelluric Data

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Magnetotelluric uses a frequency-dependent impedance tensor, which is estimated from the spectra of associated time-varying horizontal electric and magnetic fields measured at the Earth's surface, to image the electrical structure of the Earth. Most current methods use Fourier transform based procedures to estimate power spectral densities and, therefore, assume that the signals are stationary over the record length. Stationarity in geomagnetic data, however, is not always ensured given the variety of source mechanism causing the geomagnetic variations at different time and spatial scales. Additional complication and bias may arise from the presence of noise in the recorded electric and magnetic file data. We explore a new heuristic method for dealing with the non-stationarity of MT time series based on Empirical Mode Decomposition. It is a dynamic time series analysis method, in which complicated data sets can be decomposed into a finite and small number of Intrinsic Mode Functions. Intrinsic mode functions allow the calculation of physical meaningful instantaneous frequencies.
In this abstract, we use the empirical mode decomposition method to decompose Magnetotelluric data into intrinsic mode functions and calculate the instantaneous frequencies and spectra to determine the impedance tensor. We investigate the reliability of the impedance estimates on synthetic data by comparing the results to those obtained by analytical methods. Also, we apply our processing scheme to data measured from the Costa Rica subduction zone, and compare the results from our new method to the frequently-used BIRRP processing method. Furthermore, new method has the possibility of noise visualization and filtering, which is especially important in marine applications, where noise free time segments maybe short.