IMPEDANCE TENSOR ERROR ESTIMATES VERSUS MAGNETOSPHERIC ACTIVITY

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Time-lapse magnetotellurics aims at studying resistivity variations in the earth due to internal processes, especially when aqueous or magmatic fluids are involved. Reliable estimates of the uncertainties of the MT parameters are essential to determine accurately the occurrence and timing of a subsurface event. These estimates depend mainly on magnetospheric activity. Chave and Thompson's (1989) estimation of errors is based on the internal dispersion of parameter estimates. We have run synthetic tests to assess whether the parameters and errors obtained by their approach (RRRMT software) are suitable for time-lapse studies. A measured ULF magnetic field is convolved with known impedance tensors to generate a synthetic electric field entirely correlated to the magnetic field. Both MT fields are then input into RRRMT. The resistivity estimates and their errors are then compared to the known values and we found significant differences between RRRMT and expected results. We have therefore designed a new and simple method to estimate errors in all dimensional cases. We present our results for both 1D and 3D cases, which leads to more realistic estimates than those obtained by RRRMT. Furthermore, we have initiated a study of the influence of magnetospheric ULF micropulsation activity on the measured error on impedance estimates, using synthetic data sets. Three methods are being considered: spectral electromagnetic energy, F. Plaschke's field-line resonance detector and an ad-hoc multifractal approach.

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