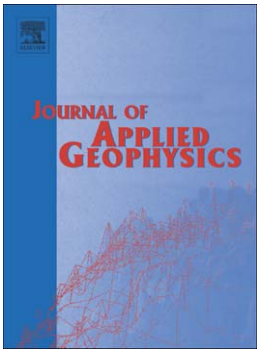

Separation of plain wave and near field contributions in Magnetotelluric time series: A useful criterion emerged during the Campi Flegrei (Italy) prospecting

M.G. Di Giuseppe, A. Troiano, D. Patella

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Separation of plain wave and near field contributions in Magnetotelluric time series: a useful criterion emerged during the Campi Flegrei (Italy) prospecting.

M. G. Di Giuseppe, A. Troiano, D. Patella

Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Napoli Osservatorio Vesuviano

Abstract

The presence of coherent noise in the Magnetotelluric time series greatly obstacles the application of this powerful technique in highly urbanized environments. Here the experiences gained during an intensive prospecting of the Campi Flegrei caldera (Italy) are described. In this area the presence of an extensive electrified railroad comports the contamination of the electromagnetic signal by high level of noise related to randomly moving sources. The main task consists in the search for a way to discern the plain wave signal from the noise. This has been achieved through a first application of the well-known RMEV estimator to the time series collected in the area in order to characterize the global structure of the signal and then through various tests performed on both synthetic and real field Magnetotelluric data. In the end, an empirical criterion has been deduced, based on the rotational analysis of the dominant eigenvectors of the time series Spectral Density Matrix, apt to isolate the plain wave component of the Magnetotelluric data. A variation of the standard RMEV scheme has been successively applied in order to obtain a reliable estimate of the apparent resistivity curves. This application has proven its suitability for the time series collected in the Campi Flegrei area, but the logic at its basis could be a key to deal with more general cases.