Geophysical Research Abstracts, Vol. 8, 01207, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01207

Identification of potential fields sources with the continuous wavelet transform in the case 3-D: methodology and application on the aeromagnetic data of the Tin Bider and Amguid craters region in the Sahara (Algeria).

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The characterization and the localization of geophysical potential fields sources (electrical, magnetic, gravitational, thermal, etc.) measured at the surface of the Earth continue to motivate numerous methodological studies techniques. Inversion methods are aimed at recovering the source distribution by inverting an integral equation linking the source distribution to the measured potential field, leading to more or less sophisticated algorithms depending on their ability to tackle with geological prior constrains to reduce non-uniqueness.

In this work, we present a method based on the wavelet transform, which is used to localize the causative bodies or sources of potential field anomalies. In previous studies we introduced a particular class of wavelets belonging to the Poisson semigroup such that the analyzed anomaly has a conical signature in the wavelet domain with its apex pointing at the location of the causative homogenous source, in particular, adapting the 1D wavelet method to the 2D case and to enable to process potential field maps. We attack this matter by proposing a wavelet method based on the use of the so-called ridgelet functions. We show how the method developed may be used to analyze anomalies caused by elongated source distributions. We also present and discuss some preliminary results obtained by an application of this method to aeromagnetic data acquired on the Amguid crater region, in the Sahara (South of Algeria).