

The main goal of the proposed work is to delineate structural boundaries in a very complex geology environment using the spatial and statistical properties of the potential field data. The analysis is performed using magnetic anomaly of the total field data over In Ouzzal, an Archaean north–south elongated block belonging to the Hoggar (Algeria). This region is geologically and geophysically very poorly known except some localized areas. The intrinsic properties of high-frequency signals and the related causative sources are explored, thanks to two-dimensional continuous wavelet transform. The obtained results, represented by spatial distribution of the maxima of the modulus of the wavelet transform at each scale, clearly show that the major magnetic singularities of the field may be related to geological features. Comparison with the Euler’s deconvolution solutions exhibits a very good correlation. Even though where geological structures are known, our method shows better resolution and accuracy. The proposed multiscale method proves to be more powerful, easy to use, and versatile where classical methods of potential field interpretation fail or are very constraining. However, work is still ongoing to try to better and fully characterize the causative sources of the potential fields