

A NEW ENVIRONMENT FOR ANALYSIS, PROCESSING AND INVERSION OF POTENTIAL FIELD DATA

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Traditionally potential field data are represented and analysed as 2D images. We propose an alternative 3D representation, in terms of multiscale edges. In image processing the term edges refers to the main features in an image, that in potential field data correspond to the location of the major anomalies, geological contact, faults etc. Multiscale edges can be seen as a transform of the image in a rigorous mathematical sense, i.e., they contain the same information as the original data, and the image itself can be reconstructed from the multiscale edges through an inverse transform. This representation can be advantageous for a number of applications. First, by automating the time consuming extraction of the main features in the image (i.e., the edges themselves) it facilitates and enhances the visual interpretation of the image. Second, by manipulating the multiscale edges before image reconstruction, a set of 'feature-based' image processing tools are available (de-noising, feature removal or enhancement etc). Because of the localisation of the edges, these tools can be applied to specific anomalies with limited perturbation of adjacent areas. Third, the multiscale edges contain information about the shape and location of the causative sources, and consequently can be used for inversion. Eventually, by proper filtering in the wavelet domain the downward continuation process can be stabilised. A number of particularly promising experiments with both synthetic and real data has been successfully performed.