

DETECTION OF GEOLOGICAL FEATURES ON GEOPHYSICAL AND GEOCHEMICAL DATA WITH TWO DIMENSIONAL FRACTAL FILTERS

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Spectrum analysis has been widely used for image processing particularly for detection of features of different sizes and orientations in geoscience. Geological features in different scales and orientations often show distinct spectral properties in geophysical and geochemical fields that can be detected by means of spectral analysis in frequency domain. In the traditional power spectral analysis the focuses were often given to characterizing wavelength and the relatively simple anisotropy in a two-dimensional power spectrum. In this paper, the distribution of the power spectrum has been taken into accounts as additions. The irregularly shaped fractal filters constructed according to the spatial distributions of power spectra by means of multifractal concentration-area method have been applied to extract different components from geophysical and geochemical fields. The resultant patterns separated by the fractal filters can be used in interpretation and detection of subsurficial or undiscovered geological features. A case study has been conducted to interpret and detect gold associated geological features in Meguma Terrane, the southern Nova Scotia, Canada. The subsurficial features of igneous rocks and the framework of linear structures have been interpreted upon gravity, aeromagnetic and lake sediment geochemical data. It shows that using the spectral fractal filters to process geophysical and geochemical data is effective for geological feature detection.