



Multifractal singular value decomposition (MSVD) for extraction of marine gravity anomaly

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The concept of singularity is used for characterizing different types of nonlinear natural processes, including volcanic eruptions, faults, cloud formation, landslides, rainfall, hurricanes, flooding, earthquakes, wildfires, oil fields and mineralization. The singularity often results in anomalous amounts of energy release or material accumulation within a narrow spatial-temporal interval. The marine gravitation field has multi-fractal features, which show different scale invariant properties in region and local field. The SVD can be used in geophysical data processing for signal and noise separation, radar processing for enhancing weak signals in vertical seismic profiles (VSP). It has also been used in multi component seismic polarization filters and evaluating the amount of wavy reflections in ground-penetrating radar (GPR) images of base surge deposits. With the SVD, a matrix X can be decomposed to a series of eigenvalues. The eigenvalues conformed fractal or multi-fractal distribution described with the power-law function. The multi-fractal SVD can be used for feature extraction and anomaly identification for marine gravity investigation. This paper aims to analyze the marine gravitation data using the SVD and multifractal methods. This paper will also aim to more clearly define the spatial relationship between marine mineralization and the deep geological structures in the field by extracting the marine gravitation information at a particular frequency to provide valuable in depth evidence for predicting new deposits and deep tectonic.