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Multi-scale sparse decomposition of image and its application in remote sensing image fusion

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Morphological component analysis (MCA) is a successful example of a sparse image decomposition algorithm. Building on MCA, a multi-scale sparse image decomposition method, called m-MCA, is presented in this paper. M-MCA combines Curvelet Transform bases and Local Discrete Cosine Transform bases to form the decomposition dictionary and controls the entries of the dictionary to decompose the image into texture component and cartoon component. From the aspect of the amount of information, a remote sensing image (RSI) fusion method based on multi-scale sparse decomposition is proposed. Via sparse decomposition, the effective scale texture component of high resolution RSI and cartoon component of multi-spectral RSI are selected to be fused together. Compared to the classical fusion method, the proposed fusion method gets higher spatial resolution and lower spectral distortion with a little computation load. Compared to sparse reconstruction fusion method, it achieves a higher algorithm speed and a better fusion result.

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Lateral protrusions (plate-flows) in the structure of the Earth's lithosphere

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Within the Earth's lithosphere, there are specific structures, known as lateral protrusions or plate-flows. These structures are playing an important role in the continental and oceanic architecture of the Earth's crust. They are a fundamental and widespread phenomenon that controls many features of the tectonic and geodynamic evolution of platform and foldbelt basement. Geologically, the lateral protrusions or plate-flows provide spatially constrained, nearly horizontal rock bodies with attributes of 3D tectonic flow and lateral transport of rock masses. Similar structures have been found in various parts of the World both within the continental and oceanic lithosphere. Among them are the Baltic shield, Anatolia, Tian Shan, South Africa, East-European platform, the Scotia sea, Caribbean region, etc. The occurrence of flowing layers embodies the internal mobility of enormous volumes of rock masses and the possibility of their lateral redistribution at various depth levels of the continental lithosphere. This phenomenon is also reflected in the tectonic-physical and mathematical models. The existence of such structures was confirmed by interpretation of space images. The report, on the example of geodynamic polygon "Baikal", contains a methodology of the comprehensive cosmo-geological study of the lateral tectonic movement structures.

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