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Mineral mapping based on spectral angle mapper and spectral distance classification with zero-crossing wavelet method

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Due to the low spatial resolution of hyper-spectral image, there are a large of mixed-pixels, which restrain the mineral identification and classification accuracy. Spectral Matching method is utilized with the help of spectral curves and different methods have different impacts on identification accuracy. Compared with previous Spectral Matching method which only considers the constrain of spectral angle, this paper proposes Spectral Angle Mapper and Spectral Distance (SAM-Distance) method which adds both spectral angle and distance between the test spectrum and the reference spectrum as constraints. And it can be verified that proposed method has obvious advantages in identification accuracy. Besides, Marr wavelet is used as primary functions of zero-crossing wavelet to determine the values of SAM-Distance and a novel mineral mapping rule based on SAM-Distance is proposed. The Nevada Cuprite AVIRIS data are used in the experiment. We conduct comparative experiments with SAM method, PCA method, K-means method and SAM-Distance based on zero-crossing wavelet method. The results of mineral mapping show that the spectral identification ratio based on SAM-Distance method with zero-crossing wavelet is higher than some other methods. Besides, its results have richer details and are closer to the results obtained by Clark et al.

Index Terms－Hyperspectral image, mineral mapping, Zero-crossing wavelet, Marr wavelet, SAM-Distance