

# Study on Exploring for Oil, Gas Using Hyperion data

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Reflectance spectra in the visible and near-infrared wavelengths provide a rapid and inexpensive means for determining the mineralogy of samples and obtaining information on chemical composition. Hydrocarbon microseepage theory setup a cause-and-effect relation between oil and gas reservoirs and some special surface alterations. Therefore we can explore for oil, gas by determining reflectance spectra of surface alterations. This determination can be fulfilled by means of field work and hyperspectral remote sensing. Our cooperative R&D project, which is sponsored by China National Petroleum Corporation (CNPC) and committing itself to exploration of oil, gas in Qinghai A~A~ area of China using NASA experimental Hyperion hyperspectral satellite, documents a macroscopical feature of reflectance spectra of typical observation points in gas fields, and then proposes a method in order to provide surface distribution information (e.g., classification) of alterations based on the reflectance spectra determined from the field and remote sensing, and obtain anomaly zones of the special alterations. This method mainly includes preprocessing of Hyperion images to improve the poor SNR (Signal Noise Ratio) of them, principal component analysis (PCA) based on wavelet transform to reduce dimensionality, and techniques providing surface distribution information using both absorption-band parameters such as the position, depth, width, and asymmetry of the spectra and similarity of the entire shape between two spectra. Finally, several anomaly zones of alterations are obtained, which are basically in accord with 3 bigger existing gas fields in Qinghai Sanhu area.

Keyword: hyperspectral remote sensing; reflectance spectra; exploration of oil, gas; feature analysis; alteration anomaly