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Evolution and Emerging Techniques of Digital Image Processing, Aid of Aster and ETM+ Data to Target the Minerals and Rock Types of Proterozoic Sedimentary Basin

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Summary

Remote Sensing (RS) is an emerging technology in geological studies and mineral targeting. Advanced Space borne Thermal Emission and Reflection Radiometer (ASTER) and Landsat Enhanced Thematic Mapper plus (ETM+) images were used to map and (a) classify the various rock types in Proterozoic Cuddapah sedimentary basin namely the rock types limestone, dolo-limestone Ferruginous phyllite and manganiferous altered rock (b) discriminate the lithology and carried out the geochemistry with the correlation to image signatures obtained by the ASTER and structural aspects of the markapur area is well expressed with ASTER DEM existed geomorphology . A wide variety of digital image processing techniques were applied such as the Decorrelation Stretching, Principal Components (PC) analysis, Independent Principal Components and Band Ratio. The color composite of Principal Components (1, 2, and 3), the ratio images (3/1, 4/3, and 5/7) and the IHS (1, 3, 5) of ETM+ data and for the ASTER data the color composite of PCA (4,6 and 8), the ratio images (5/3, 5/4, 7/5 and 13/14) enabled us to determine the different types of rock types by evaluating the spectral signature. Finally, the hyperspectral technique was used for detecting the different minerals in the study area by the aid of Field spec spectroradiometry by collecting the spectral profiles under controlled laboratory environment. Spectroradiometry is effectively operative in the wavelength domain of 350 - 2500 nm and this spectral signatures are matched with standard USGS spectral library of minerals. The study demonstrates the capability of advanced satellite images, potentiality of image processing methods in the field of geological mineral mapping.

Keywords: Aster, ETM+, Mapping, Emerging Techniques and Image Processing