Evaluation of The Remote Sensing Data for Mineral Exploration Case Study : Eastern Anti-Lebanon Terrains, Syria

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Landsat-5 Thematic Mapper, Spot-XS, and Radar-SAR(C-band)data recorded over Anti-Lebanon terrains,Syria were analyzed to determine the applicability of using of space imagery data for identifying and mapping hydrothermally altered, potentially mineralized rocks. Digital masking was used to eliminate ambiguities due to water and shadows. However, some ambiguities in identification resulted between altered volcanic rocks and unaltered sedimentary deposits that contained clays, carbonate, and gypsum, and between altered volcanic rocks and volcanic tuffs diagenetically altered to zeolites.

Prior to the availability of TM, Spot, and Radar data, most remote sensing for mineral exploration and assessment utilized Landsat multi-spectral scanner (MSS) data. Because the MSS is incapable of sensing beyond 1.1 μm, its usefulness for mineral exploration is limited to the detection of limonitic materials, which produce broad absorption bands in the visible and very-near-infrared part of the spectrum. Limonite is used here as a field term to describe ferric iron oxide, oxyhydride, and sulfate minerals such as geothite, hematite, lepidocrocite, and jarosite, among others, which commonly form as primary or secondary products of hydrothermal processes.

The TM scanner features three major improvements over the Land-sat MSS : increased spectral, spatial and radiometric resolutions. Two of the spectral channels(1.6 μm and 2.2 μm) are located in wavelength regions which allow detection of hydrous minerals as well as iron oxides, using data from other bands. Three mineral deposits in the area under study were selected for investigation. These sites present a range of iron occurrences with different host rocks, level of erosion, and stages of development .