

Lithological mapping and hydrothermal alteration using ETM⁺ and ASTER data: a case study from Ahovan area, Iran

M. KHANEHDAR* AND M. REZAEI-KAHKHAEI

Department of Petrology and Economic Geology,
Faculty of Earth Sciences, University of
Shahrood of Technology, Shahrood, Iran
(*correspondence: Petrom59@yahoo.com)

Ahovan area located at about 30 km northeast of Semnan is part of Central Iran structural zone. Semnan province is one of best province from Iran for mining. Previous field and geochemical studies showed that the presence of intrusive gabbro and granite among volcanics, marl, limestone, sandstone and conglomerate is likely for hydrothermal alteration and finally mineralization in the Ahovan area. Remote sensing has been widely used to map geological structure, rock types and hydrothermal alteration. Here, it was tried to update the geological map and alteration zones in the Ahovan area by ETM⁺ (Enhanced thematic mapper plus) and ASRER (Advanced space borne thermal emission) sensor data from Landsat and Terra satellites. The results of ETM⁺ and ASTER data by crosta technique, PCA (Principal components analysis) and Ls-Fit (Least square fit) represent that most the alteration zones are located in North, central and western parts of Ahovan area which might be suitable for mining. The results also consist with the field studies and the presence of Iron, Barite, Kaloin and Tuff mimes in some of those areas. The False color composite, band ratio and OIF (Optimum index factor) has been used for precise difning of lithological variety of the study area. False color composite method based on bands composite (5,4,3) of ETM⁺ and (14,4,13) of ASRER and their integrating with above methods provided a good geological map for the study area. In False color composite method of bands composite (5,4,3) of Landsat data, basalts is shown in black, gabbro in magenta as small patches and granite in bluish- gray colors. Moreover, when 7/5, 5/4,3/1 band ratios were used, the metavolcanics are observed in green to yellowish colors in East and central regions, andesites are identified with cyan color in West and southeast of the study area.