Mapping gold deposits in the Muteh area, central part of the Sanandaj–Sirjan, Iran Using Landsat ETM$^+$

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Abstract

Enhanced Thematic Mapper plus (ETM$^+$) images covering the Muteh area in the Central part of Sanandaj-Sirjan metamorphic zone were evaluated for mapping of lithology, gold-related alteration zones and geologic structure. The basement of the study area is composed of metamorphic rocks including granite intruded into a variable mixture of metavolcanics and metasediments. Firstly, color composite (741) in RGB was applied to identify the lithological units. The results show that this image discriminates the granitic rocks from the adjacent rock units very well. The ETM-derived rock units show excellent correlation with those on the reference geologic map. The chlorite schist, felsic schist and metarhyolite are dissected by gold-bearing quartz veins which are surrounded by alteration zones. Band ratio (7/5, 5/4, 3/1) in RGB and principal component analyses (PCA) were applied to map the alteration zones as indicated by field verification work. The structural features were enhanced by the application of linear contrast stretching, and directional cross edge detection filter. Overlying extracted faults and alteration zone classification images show that the NW fractures represent potential zones for gold exploration. Results have proven to be effective, and in accordance with the results of field survey and geochemical analyses. In conclusion, the image processing methods can be used to provide cost-effective, comprehensive and accurate information to discover possible locations of gold mineralization in other parts of the Sanandaj- Sirjan metamorphic zone.

Keywords: ETM$^+$ data, lithological unit, structural feature, gold mineralization, Muteh, Iran

Abstract IGRDJ September 2014