Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06562, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06562
EGU General Assembly 2008


# Application of SWIR and TIR spectral regions inferred from ASTER data to map the hydrothermal alteration and silicic parts accompanied by gold mineralization in the Hired mining area, southern Birjand, Iran

M. Alimohammadi (1), P. Behnia (1), M. A. Ghorbani (2) and N. Mozaffari Amiri (2)

(1) Geological survey and mineral exploration of Iran, Tehran, Iran (2) Faculty of Geosciences, Shahid Beheshti University, Tehran, Iran (alimohammadiec@gmail.com / Phone: +98 911 114 3359)

Hired gold-bearing area is located in the northeasternern border of Lut zone and western vicinity of Sistan suture zone. Several post Eocene plutons have intruded into the Eocene volcanic and pyroclastic units and caused hydrothermal alteration and mineralization of gold, copper, lead and zinc.

We have applied an Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) with three visible and near infrared (VNIR) bands, six shortwave infrared (SWIR) bands and five thermal infrared (TIR) bands to determine the alteration of Hired gold-bearing area. Spectral analysis of the surface reflectance SWIR manifests absorption in 2.20$\mu$m and 2.33$\mu$m wavelength regions. Absorption in 2.20$\mu$m (band 6), due to Al-OH anionic agent exhibits the presence of clay minerals (Al-illite, kaolinite) and sericite, whereas absorption in the 2.33$\mu$m region (band 8) due to Mg-OH anionic agent and carbonates demonstrates the existence of chlorite, epidote and calcite minerals. In this study different image processing techniques such as band combination, band ratios transformation, and binary encoding were used to identify and delineate the altered minerals accompanied by gold mineralization. Analysis of the spectral emittance data in the five TIR bands has presented valuable subsidiary lithological information. It would not be possible to identify silicified rocks in the nine VNIR+SWIR bands due to the lack of recognizable spectral absorption fea-

tures in quartz in this wavelength region. We have therefore mapped Quartz-bearing surface deposits as well as hydrothermal silicified rocks in the TIR bands by using a band $(b_{11} \times b_{11})$ / $(b_{10} \times b_{12})$ ratio image. The results obtained from ASTER data are compatible with conclusion inferred from thin sections and XRD of the field samples. In this way, ASTER data are actually reliable and robust in order to hydrothermal alteration mapping and ore deposit exploration. This technique is beneficial due to its open availability, high accuracy and low cost.