

Integrated analysis of hydrothermal alteration, structural features, and host rock lithologies associated with copper-gold mineralization, NW Saveh, central Iran

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The studied area covers 1440 km² in central Iran and includes several porphyry and IOCG Cu-Au prospects (e.g., Aftabru, Alishar, Eshtehard, Nobaran, and Savehprospects), which were studied to define their significant characteristics for exploration targeting of these types of deposits. Image processing methods such as spectral angle mapper (SAM), least square fit (Ls-Fit) and band ratio were applied to the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) data to map hydrothermal alteration, iron oxides, and structural features, which could be spatially associated with the mineral deposits in the UDMA (Uromieh – Dokhtar Magmatic Assemblage) of central Iran. Based on weights-of-evidence analyses of geological and spectral data representative of the deposits, a predictive geographic information system (GIS) model was constructed to locate areas of interest for future gold and copper exploration in the area. The targeting elements include geology and multispectral remote sensing data such as lithological units, alteration, and structural features. An exclusively knowledge-driven fuzzy model was applied for integrating the exploration layers, leading to the mapping of the well-known mineralized areas and several unknown potential areas. This research demonstrates that the central UDMA has a remarkable potential for Cu-Au mineralization and needs to be studied at more detailed scales for detection of undiscovered and likely concealed mineral occurrences.