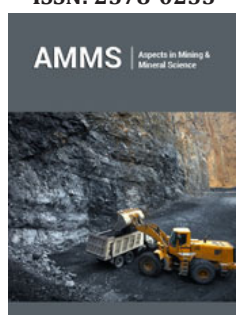


The Manto-Type Copper Mineralization in the Eocene Volcano-Sedimentary Sequences, Western Alborz-Azarbayjan Belt, NW Iran

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Opinion

Introduction

Iran is located in the middle part of the Alpine-Himalayan orogenic belt and resulted from the evolution of the at least three Tethyan oceans (Proto, Paleo and Neo-Tethys). The evolution of Tethyan oceans caused to formation of different types of mineralization in Iran during Precambrian- Cambrian to recent time. The manto-type copper deposits is one of the most important deposits in Iran which occurred within the Urumieh-Dokhtar Magmatic Arc (UDMA), Lut block, Sanandaj-Sirjan Magmatic-Metamorphic Zone (SaSZ), Sabzevar subzone and mainly Alborz Magmatic Belt (AMB). The most significant magmatic activity occurred in the AMB during the Eocene time which consists of volcanic and volcano-sedimentary rocks with alkaline to shoshonitic affinity [1-3]. These rocks are investigated as Karaj Formation with 3-5km thickness which developed in a back-arc basin [1]. The volcanic and volcanoclastic rocks are intruded by late Eocene granitoid bodies with high-K calc-alkaline to shoshonitic affinity which are interpreted as arc magmatism [2-4].

Outline of Manto-type copper deposits in Iran

The most important copper deposits in Iran located in the UDMA and the AMB. Copper deposits in the UDMA are mainly porphyry type which are associated with Cenozoic magmatism [5-7]. The manto-type copper deposits in Iran are distributed in the SaSZ (Kesht Mahaki deposit [8], UDMA (Kashkouieh and Veshnaveh [9]), Sabzevar subzone (Abgareh, Zangalou, Kimia, Tarannom, Nasim, Kalabri, Sharifabad, Dahanesia, Pirmardan, Dochileh, Abbas Abad, Chah Moosa, Choghondar Sar and Bozorg mine deposits [10-12]) Lut block (Varzag deposit [13]) and AMB (e.g., Mari [14], Dohneh, Chizeh, Zaker, Golharoud, Platelou, Gheshlagh, Sorkhe Dizaj, Kordkand and Daveh Yataghi) (Figure 1). All of these deposits, except Cretaceous Kesht Mahaki deposit, formed within the Eocene volcanic and volcano-sedimentary rocks. There are many copper deposits in the AMB, mainly within the Tarom subzone which can be considered as manto-type deposits. These deposits mainly occurred within the Eocene basaltic and andesitic rocks of the Karaj Formation. Manto-type copper deposits in the Tarom area occurred in forms of vein-veinlets, open space filling and replacement within the basaltic and andesitic rocks. Some of these deposits such as Dohneh deposit has more similarity to the Michigan copper deposits but most of them may be classified as Manto type copper deposits. The main important ore minerals at the Michigan type deposit consist of native copper, native silver, cuprite, malachite and azureite. The chalcocite, chalcopyrite, pyrite, bornite, malachite, azurite, chalcocite and iron oxide minerals are the most important minerals in the Manto type copper deposits at the Tarom Subzone. The mineralization is accompanied by silicification, zeolitization, chloritization, epidotization and carbonatization which formed

in form a replacement, vein-vein and open space filling in the host rocks. According to the field observation, mineralogy and alteration assemblage it may be state that these deposits occurred during the

burial metamorphic process. In the other hands, the injection of ore-forming fluids into the fractures in the host rocks caused the precipitation of copper and silver minerals.

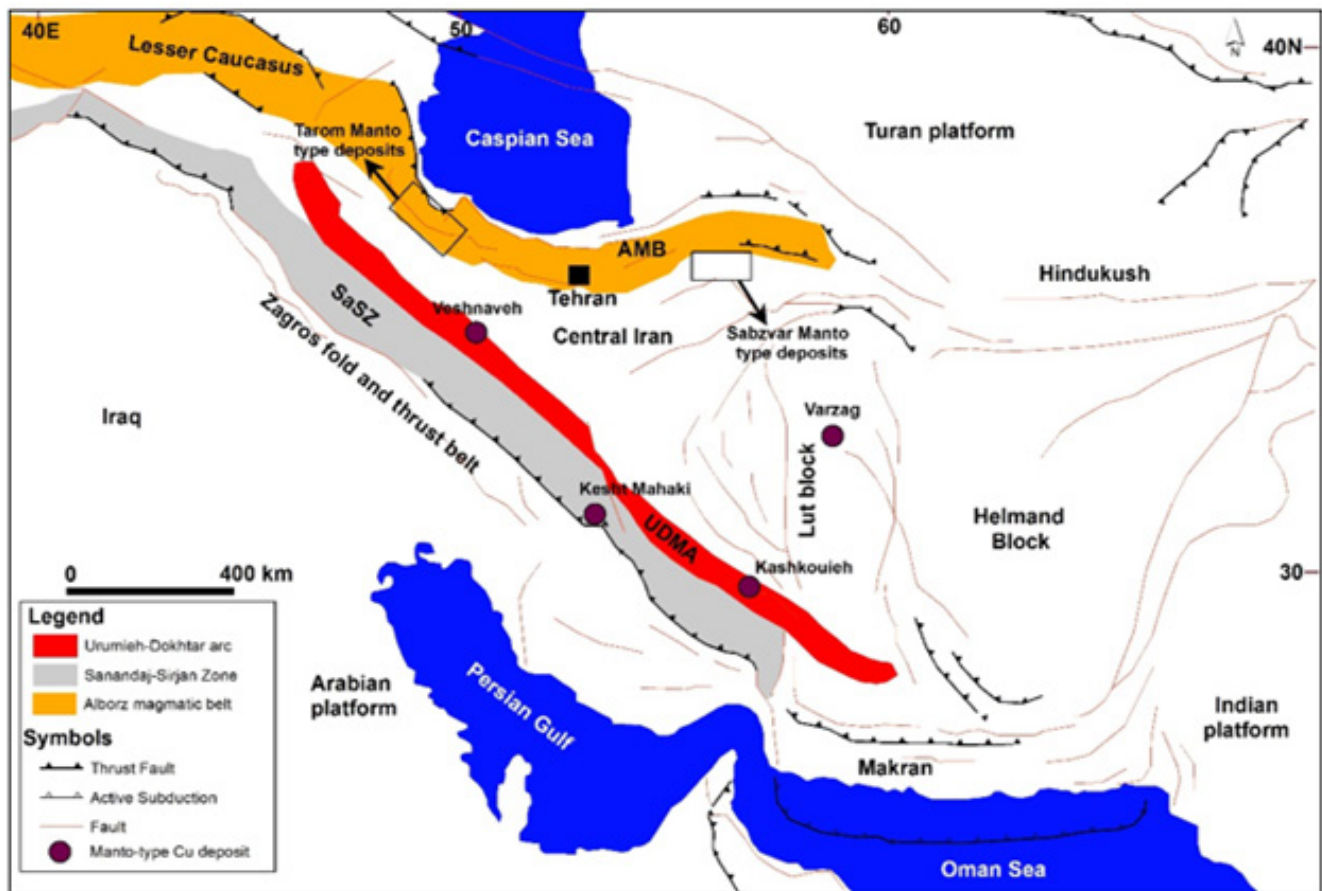


Figure 1: Distribution of Manto-type Cu deposits in the simplified structural map of Iran. For the Manto-type Cu deposits in the Tarom and Sabzevar subzones.

Conclusion

The Eocene volcanic and volcano-clastic sequences are the main host rocks for the Manto-type copper deposits in Iran. Although there are some Manto-type deposits in the SaSZ and the Lut block, but most of the Manto-type deposits occurred in the UDMA, AMB and the Sabzevar subzone. The Eocene magmatic pulse is a significant arc volcanic activity across Iran. Thus, the investigation of Eocene volcanic and volcano-clastic sequences along the UDMA, AMB, Sabzevar subzone, SaSZ and the Lut block can be proposed for future exploration of Manto-type Cu deposits.

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