The role of organic matter in genesis of sedimentary-hosted stratiform copper deposits in Nahand-Ivand area, NW Iran

*SADATI N.[1], YAZDI M.[1], BEHZADI M[1]. ADABI M.H[1]. AND MOKHTARI A.A[2]

[1]Department of Geology, Faculty of Earth Science, Shahid Beheshti University, Tehran, Iran (*correspondence: sadati_sn@yahoo.com)

[2]Department of Geology, Faculty of Earth Science, Zanjan University, Zanjan, Iran([2] mokhtari1031@gmail.com)

The study area is located in part of Arasbaran- Sabalan zone in the northwestern part of Iran. Cu mineralization in Nahand - Ivand area is observed in sandstone rock units belonging to the Ghom Red beds Formation of Miocene age[1]. The Ghom Red beds Formation include alternations of red oxidized (iron oxide minerals) sandstones and conglomerates that partly convert to reduced clastic such as sandstone, siltstone, shale, conglomerate, limestone, dolomite and marl, which may contain carbonaceous or organic matter. Also Evaporites such as gypsum and salt are commonly associated. In this study, zones of reduction (grey, white, green) within oxidized red-bed sedimentary rocks are the most favored host rocks. The color of the host rocks ranges from light gray to black, reflecting their high organic matter content.

Mineralization is localized in the organic-rich and pyrite-containing gray rocks that replace the red rocks along the vertical and lateral directions[2].The main ore minerals in the deposit are copper carbonates such as malachite, azurite and some copper sulfides such as chalcocite[3]. During this study 44 samples were collected from the Ghom Redbeds Formation. Host rock and mineralized samples were analyzed for major and trace element contents by Inductively Coupled Plasma–Mass Spectrometry (ICP- MS). The results showed that In addition to copper, precious metals such as silver are less focused. In this area maximum grade of samples are up to 5.2% Cu with an average of 1.4% Cu. Copper precipitation was possibly promoted by reduction zones from organic matter such as woody fragments and plant fossils[4]. It seems that during the formation of the copper deposits, organic matter played an important role in adsorbing and gathering metallic elements [5].

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REE contents in soils and sediments from the GEMAS and FOREGS data-bases: comparison between different geological contexts in Italy and Sweden

M.SADEGHI[1], P.PETROSINO[2], M.ANDERSSON[1], S. ALBANESE[2], A.LADENBERGER[1], G. A. MORRIS[1], J.UHLBÄCK[1] , A. LIMA[2] AND B. DE VIVO[2]

[1]Geological Survey of Sweden, BOX 670, S-75128 Uppsala, Sweden (* correspondance : martiya.sadeghi@sgu.se)

[2]Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, Università degli Studi di Napoli Federico II, L.go S. Marcellino 10, 80138 Napoli

Rare Earth Elements (REEs) are rapidly gaining attention as important chemical resources thanks to the increasing number of high-tech applications in which they are required and, as a consequence, scientific interest on REE-bearing minerals and resources is increasing. In this study, REE data from the FOREGS database of solid media chemistry (topsoils, subsoils, stream sediments, floodplains) have been used to constrain elemental distribution maps. Principal Component Analysis (PCA) has been applied to identify patterns within the data set. Detailed investigation of the distribution of REEs in all media for both countries shows the prominent role played by geogenic components. Despite similar REE concentrations in the underlying bedrocks, several significant differences emerge between the two countries driven by climate, morphology of the territory, age of the deposits, presence of mineralisation, type of soils and presence/absence of till.

The same approach has been applied to the GEMAS database to compare the REE distribution in agricultural and grazing land soils, using the same statistical approach as used for solid media from the FOREGS database. In general, high pH alkaline soils show higher REE concentrations. Certain specific anomolies can be correlated to known phosphate and REE mineralizations. The fingerprint of anthropogenic activity, both agricultural fertilizer use and cattle feed, does not influences the geogenic signal. In both Italy and Sweden, REE concentrations in agricultural and grazing land soils are comparable with those obtained for topsoils sampled from unoccupied and indisturbed areas. The main difference between the elemental distibution of REEs is more closely related to the geochemical behaviour of invidual elements and their extractability as affected by the source of the elements in the sample media.