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Trace and rare earth elements fractionation in volcanic- and sediment-hosted Mn ores: a study case of Sardinia (western Italy).

Rosa Sinisi
University of Basilicata, Department of Sciences, Italy (rsinisi@uniss.it)

It is widely accepted that, regardless of the geological environment (continental, marine or hydrothermal), the occurrences of clay minerals and/or mineral phases with clay-type crystal structure (as zeolites and Mn-oxides), play a key role in the trace elements and REEs uptake processes. The REE resources are produced mostly from ion-adsorption type REE deposits of southern China that are formed by weathering of granitic rocks and subsequent chemical adsorption of REE on clay minerals. A significant group of minerals with a high metal uptake capacity is represented by Mn oxides. Their "tunnel" structure, in fact, allows both the absorption (inside the minerals) and adsorption (outside the minerals) of cations and anions producing metal accumulations with economic and environmental significance. However, the ores, mainly that forming within sedimentary environment, often have impurities due to presence of minerals unrelated to mineralization. These minerals can significantly alter the compositional features of the ores and suggest misleading conclusions. In Sardinia (Italy, western Mediterranean), Mn-oxide mineralizations occur and recently their origin has been discussed and identified (Sinisi et al. 2012). In this study the mineralogical and chemical compositions of the Sardinian sediment-hosted and volcanic-hosted Mn-ore are exhibit exploring the possibility that they can represent exploitable trace and REE mineralizations. High contents of metals characterize these Mn deposits. Besides some trace elements (Ni, Cr, Zn, Cu, As, Pb, and U) that commonly typify the Mn oxi-hydroxide ores, all rare earth elements showed high concentrations in the Sardinian deposits, comparable to those of the main actually exploited REE sinks. For this reason, a simple statistical data treatment (R-mode Factor Analysis) was performed on fifteen and nineteen samples of sediment-hosted and volcanic-hosted Mn ore respectively, in order to identify both the mineral phases trapping trace and REE in Mn ores from different geological settings and the geochemical processes promoting the metal accumulation. Results clearly showed that in the studied deposits only the contents of trace metals may be referred to uptake process on Mn mineral phases. On the contrary, REE are probably hosted in silicates, such as zircons and clay minerals, that also characterize the mineralization or their presence is due to redox processes not linked to Mn ore deposition.

Sinisi R., Mameli P., Mongelli G., Oggiano G. (2012). Different Mn-ores in a continental arc setting: geochemical and mineralogical evidence from Tertiary deposits of Sardinia (Italy). Ore Geology Reviews, 47, 110-125.