Strategic elements, REEs and PGEs in Fe-Mn crusts from the Canary seamounts: Preliminary study

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Fe-Mn crusts from the Canary Islands seamount area (Central East Atlantic) were studied to establish their contents in base and strategic metals and their genetic models. Analized elements were major metals (Fe, Mn, Ti) traces (Co, V, Ni, Mo, Cu, Zn), REEs and PGEs and associated mineralogy. Sixteen samples were collected from slopes and summits at four seamounts: The Paps, Tropic, Echo and Drago. Selected samples present different colour, surface textures and thickness (up to 25 cm) in order to include all different types found in dredge stations.

Mineralogical and chemical studies of these Fe-Mn crusts indicate their hydrogenetic origin. RXD analysis shows the abundance of Fe-Mn oxy-hydroxides. The main Mn minerals are vernadite, and todorokyte and asbolane-buserite in minor proportion growing interlayered. Fe oxides are goethite group minerals specially ferroxyhita and goethite. XRF and ICP-MS techniques show the high average contents of Fe (21 wt%) and Mn (14.5 wt%), and trace elements as Co (4200 μg/g), Ni (2500 μg/g) and V (2100 μg/g). REY contents show a mean of 2500 μg/g being the main Ce (1400 μg/g). PGEs reach an average of 200 ng/g, being Pt the most enriched (162 ng/g).

Interelements comparison diagrams have been used to show that certain metals have a specific chemical affiliation with others. The highest amounts of Mn are associated with the highest Co+Ni+Cu, while Fe have a practically direct association with REEs. On the other hand, Pearson indexes have confirmed these element affiliations.

EPMA show two principal types of micro-morphologies in the crust: 1) areas with dense lamination of oxides present in general the highest amounts of Mn, Co and Ni associated with vernadite; 2) botryoidal-layered parts have the highest amounts of Fe, Ti and V, conjoint with goethite.

Comparison between studied Fe-Mn crusts with Pacific Ocean crusts shows that canary samples have higher contents in Fe , V, Pb and REEs while Mn, Co, Ni and PGEs are about 25-35% lower. This difference can be due to the Fe-rich mineralogy of these crust supported by sedimentary (Sahara eolian dust) and submarine volcanic inputs that influenced formation of Fe oxy-hydroxides.