

Evaluation of REY enrichment in Fe-Mn crusts from different seamounts and depths in the Canary Island Seamount Province

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Marine Fe-Mn crusts have been proved to be an important potential source of different strategic and critical elements as Mn, Co, Ni, V, Cu, Mo and rare earth elements plus yttrium (REY). The Canary Island Seamount Province represents a natural laboratory and a promising area to investigate these resources and their relations with the environment. The study of Fe-Mn crust of this area show high contents of Mn, Co, Ni, V, Cu, Mo and REY (in average 18 wt. %, 4800, 2300, 1000, 600, 450 and 3000 $\mu\text{g/g}$). Forty-two representative samples from eight seamounts of this region have been studied in order to evaluate their REY contents related to the factors that influence them with the position and the water depth.

Selected samples show a great variability both of geographical locations and depths influenced by different genetic processes. Obtained results show that vernadite-rich samples with purely hydrogenetic origin can reach bulk REY contents of 3800 $\mu\text{g/g}$. Samples with diagenetic influence, represented by very thin high reflective laminae formed by asolane, busserite and/or todorokite show a clear depletion in REY contents in bulk analyses, reaching only 2900 $\mu\text{g/g}$.

This study evidence that shallowest samples have the highest REY contents (up to 3800 $\mu\text{g/g}$) and that these contents slowly decrease with depth reaching contents of 2600 $\mu\text{g/g}$ at 3100 m depth. On the other hand, samples at higher (4800 m) depths but faced to the south show high REY contents (up to 3500 $\mu\text{g/g}$). This behavior may reflect the presence of the oxygen minimum zone in the shallowest depth, but also the action of different bottom water masses that could have different physicochemical properties affecting their trace elements contents and redox conditions. This phenomenon could locally promotes the enrichment of REY on the south flanks of seamounts.