Sources of REE in fine sediments of the Portuguese shelf: Origin and dispersal pathways

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Introduction

The REE distribution was determined in 3 sediment cores (~3-4 m long) collected along the Portuguese Continental shelf in fine sedimentary deposits adjacent to large Iberian estuaries, aiming at the understanding of sedimentation processes and sources of shelf sediments.

Results and Discussion

The REE normalised patterns of the analysed samples (~40 for each core) were comparable to shales. Sediments from the shelf adjacent to Douro and Tagus rivers, draining the western Portuguese coast, exhibit a strong negative Eu-anomaly. This can be associated with the K-rich granitic rocks, which dominate the lithology of the continental adjacent region. On the opposite, the core collected at the Guadiana shelf do not have Eu depletion which can be associated with volcanic rocks present in the drainage basin. According to Munhá (1983), *in* Oliveira (1992) these volcanic rocks correspond to basalts having a geochemical behaviour similar to the mid-ocean ridges. Also, Bence & Taylor (1985) *in* Taylor & McLennan (1988) have reported an Eu enrichment on massive sulphide deposits, resulting from copper, lead and zinc precipitation, occurring near active "black smokers" at mid-ocean ridges sites. Thus, the influence of the Iberian Pyrite Belt on the Guadiana shelf sediments seems to be rather marked.

References

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Cerium and neodymium isotopic compositions in the northwestern Pacific and its adjacent seas

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We measured Ce ($^{138}Ce/^{142}Ce$) and Nd ($^{143}Nd/^{144}Nd$) isotope compositions of surface seawater in the northwestern Pacific and adjacent seas such as the East China Sea, South China Sea and Sulu Sea, where only few cerium isotopic data have been reported. The simultaneous measurement of Ce and Nd isotopic compositions may provide better constraints on their sources and mean residence times of rare earth elements in these oceanic regions.

Most of the Ce isotope ratios of surface water showed positive ε_{Ce} values in the northwest Pacific Ocean, indicating that Ce in the surface water originates from the continental crust preferentially over the mantle-derived materials. In some basins, cerium isotope ratios were affected also by mantle sources presumably via the weathering of volcanic islands arcs. Especially, significant radiogenic ε_{Ce} values were observed in the Sulu Sea and Philippine Sea surrounded by volcanic islands.

The distribution of Nd isotope ratios was similar to that of Ce isotope ratios and showed much clearer influence of surrounding sources. Nd isotope ratios of surface seawater were unradiogenic in the South and East China Seas. These values were affected from the Asian continental sources. Futhermore, their local signatures were imprinted to the open ocean by the Kuroshio Current in the norhwest Pacific Ocean. The North Equatorial Current (NEC), the begining of the Kuroshio Current, was supplied radiogenic Nd in the Philippine Sea. After passing thorugh the continental shelf of the East China Sea, ε_{Nd} values of the Kuroshio Current were influenced by the supplies of unradiogenic Nd from the Asian continent and continental shelf.

Ce isotopic distributions seemed to reflect the local sources by lateral tranportation like Nd. Both Ce and Nd isotope ratios seems to be tightly coupled during the tranport from their sources to surface water.