

REE compositions of modern shelf and deep-water articulated brachiopods

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The incorporation of rare earth elements (REEs) into the calcitic lattice of modern *Rhynchonellids* and *Terebratulids*, recovered from water depths below the neritic zone (> 500m) of the Caribbean Sea, North Atlantic, South Pacific and Southern Oceans, has been investigated. Despite the origin of the water masses and the influence of the major currents, the REE compositions of the shelf (500-1000m deep) and the deep-water (>1000m deep) brachiopod populations do not vary significantly. Shelf populations of Irminger Basin and Denmark Strait in the North Atlantic and Lau and Colville Arcs in the South Pacific display a mean REE_{SN} pattern of gradual enrichment with increasing atomic number punctuated by negative Ce excursion. Meanwhile, the mean REE_{SN} pattern of the deep-water populations from Venezuela Basin in the Caribbean Sea, Iceland Basin in the North Atlantic, and Kermadec Arc, Havre Trough and Northland Plateau in the South Pacific is remarkably similar to that of the shelf populations but the progressive enrichment is more pronounced and the Ce excursion is more prominent. The two patterns are similar to that of open ocean seawater, but remarkably different from that of the shallow water brachiopods (<500m). In contrast, shelf population of the northeast Ross Sea in the Southern Ocean and deep-water populations of Irminger Basin and northwest African continental slope in the North Atlantic deviate partly to completely of those two trends reflecting the dominated local environmental conditions of winter sea-ice formation, deep-convection and remineralization of bottom sediments.

Although some locations are situated in highly active tectonic settings and directly influenced by the hydrothermal flux, due to the flow of the water currents, the investigated shells do not exhibit any of the common REE characteristics of the hydrothermal fluids or vent communities. This strongly suggests that the hydrothermal flux of REEs that likely fades away fast within the seawater does not have a remarkable impact on the brachiopods shell compositions.