

REY-rich mud in the western North Pacific Ocean: An overview and implication for Earth system dynamics

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Deep-sea mud enriched in rare-earth elements and yttrium (REY), termed as REY-rich mud, has been expected as a novel mineral resource for the industrially critical elements. Moreover, the discovery of extremely REY-rich mud with the maximum total REY content of ~8,000 ppm in the Japanese Exclusive Economic Zone (EEZ) around Minamitorishima Island, in the western North Pacific Ocean, makes it realistic to develop the highly promising deep-sea mineral resource commercially in near future. Here we overview the progress of our researches on the REY-rich mud within the Minamitorishima EEZ towards the world's first development of deep-sea mineral resources. Moreover, we also discuss the controlling factor(s) of the formation and distribution of the extremely REY-rich mud. Our accumulation and integration of the scientific knowledge strongly suggest an intrinsic linkage between the genesis of deep-sea mineral resources and Earth system dynamics such as climate changes, ocean circulation, plate tectonics, and global geochemical cycles.

Keywords: seafloor mineral resources, rare-earth elements, REY-rich mud, deep-sea sediment, Earth system