

Origin of the Aki stratiform Fe-Mn deposits and their potential evaluation as rare earth resources.

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There are numerous stratiform Fe-Mn (umber) deposits in the Japanese accretionary complexes, which are usually associated with greenstones. The Aki deposit is one of the largest Fe-Mn deposits in the Northern Shimanto Belt, Kochi Prefecture. Based on the detailed field investigation and bulk-rock geochemical analyses, we elucidate the origin of the Aki Fe-Mn deposit and evaluate resource potential of REE.

The Aki umber samples exhibit remarkable enrichment in Fe_2O_3^* , MnO, P_2O_5 , V, Ni, Zn, and REE except for Ce compared to PAAS. Elements/Fe ratios are very similar to those of modern hydrothermal plume fallout precipitates deposited on flanks of MOR. Moreover, PAAS-normalized REE patterns are characterized by conspicuous negative Ce anomalies. These geochemical lines of evidence demonstrate that the Aki umbers are most likely ancient counterparts of hydrothermal metalliferous sediments near MOR.

The Aki umbers contain up to 913 ppm total REE, which is comparable to those (especially HREE) of ion-adsorbed clay deposits in southern China. The ore reserves of the Aki umbers are calculated to be 160,000 ~840,000 t based on geological constraints from the field investigation. As a consequence, ore reserves of REE and Dy in the Aki Fe-Mn deposit are estimated to be 220 ~1,100 tREO and 10.1 ~49.5 t, respectively.