

Reconstruction of Os isotopic record of the Permian seawater based on ferromanganese sediment in the accretionary complexes

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The Os isotopic composition of seawater is mainly controlled by influxes from continent ($^{187}\text{Os}/^{188}\text{Os}=1.0-1.3$), mantle ($^{187}\text{Os}/^{188}\text{Os}=0.13$), and cosmic dust ($^{187}\text{Os}/^{188}\text{Os}=0.127$), and thus the marine Os isotope record can be used as a good indicator of secular variation of these influxes during the geologic history. The marine Os isotope record over the past 80 Ma has been reconstructed from marine ferromanganese sediments (e.g. hydrothermal metalliferous sediments and Fe-Mn crusts) and pelagic carbonate sediments, as Os in seawater are absorbed to Fe oxyhydroxides in these sediments. In addition, the ferromanganese sediments (umbers) in the accretionary complexes are used to reconstruct the pre-80Ma seawater Os isotope record (Ravizza et al., 1999). Since geochemical characteristics of umbers are very similar to those of modern hydrothermal metalliferous sediments at mid-oceanic ridge, it is very likely that ferromanganese sediments preserve well primary Os concentrations and isotopic compositions even though they have experienced emplacement on land. Therefore, the ferromanganese sediments in the accretionary complexes are considered to be one of the best recorders of Os isotopic composition of ancient seawater.

We report Os isotope composition of ferromanganese sediments (umbers and Mn ores) from Kunimiyama (290-270Ma) and Ananai area (256-252Ma) in North Chichibu belt. Geochemical characteristics of umber in Kunimiyama area are very similar to those of modern hydrothermal metalliferous sediment at mid-oceanic ridge. On the other hand, geochemical characteristics of umber and Mn ore in Ananai area are analogous to those of modern hydrothermal ferromanganese sediment at hotspot. The $^{187}\text{Os}/^{188}\text{Os}$ ratios of these ferromanganese sediments are as follows; Kunimiyama (290-270Ma): 0.40-0.56 and Ananai (256-252Ma): 0.12-0.21. These results reveal that the secular change of Os isotopic composition of Permian seawater is analogous to that of Sr isotopic composition that has great excursion near the P/T boundary.