

# Obducted umbers as a recorder of Os isotopic composition of ancient seawater

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The secular change of Os isotopic composition of Cenozoic seawater has been well reconstructed by the Os isotopes of submarine metalliferous sediments. The umbers exposed on land have been used as a potential recorder of Os isotopic composition of pre-Cenozoic seawater. The Cyprus umbers are considered to record the  $^{187}\text{Os}/^{188}\text{Os}$  ratio of ~90 Ma seawater, based on the compositional similarities to modern hydrothermal plume fall-out materials. In order to check the validity of obducted umbers as a recorder of marine Os isotopes, however, the direct comparison between uplifted umbers and seafloor metalliferous sediments of the same depositional age is truly needed.

The Mineoka umbers overlying ~52.8 Ma MORB-type greenstones occur in the Cenozoic accretionary complex in Japan. Major, trace and rare earth element chemistry of the Mineoka umbers is indistinguishable from that of the East Pacific Rise plume particulates and metalliferous sediments, indicating that the Mineoka umbers preserve primary geochemical signatures at the time of precipitation. The Mineoka umbers are characterized by enrichment of Os and depletion of Re relative to upper continental crust. Their  $^{187}\text{Os}/^{188}\text{Os}$  ratios vary from 0.456 to 0.549, exhibiting a relatively wide range which may be due to the longer duration of the Mineoka umber deposition than the residence time of Os in seawater. The  $^{187}\text{Os}/^{188}\text{Os}$  ratio of ~53 Ma submarine metalliferous sediment has been estimated as 0.484, which agree well with that of the Mineoka umbers. Our present measurements assure that umbers uplifted onto land can be used as a recorder of Os isotopic composition of ancient seawater.