Marine osmium isotope record across the Middle-Upper Norian transition in the Upper Triassic deep-sea deposits from the Mino Belt, Japan

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Instead of a single mass extinction at the Triassic-Jurassic boundary, extinctions in major pelagic groups, such as radiolarians and conodonts, occurred stepwise during the last 15 Myr of the Triassic. Although a marked diversity decline on such pelagic fauna began in the end of Middle Norian, the cause of this extinction has been uncertain. In order to assess the Middle to the Late Norian environmental changes in the Panthalassa Ocean, we examined secular changes in the marine osmium isotope compositions ($^{187}Os/^{188}Os$) recorded in the Triassic bedded chert succession of the Mino Belt, central Japan. The osmium isotope compositions of seawater reflect contributions of the riverine ($^{187}Os/^{188}Os$ ≈1.4), hydrothermal, and extraterrestrial ($^{187}Os/^{188}Os$ ≈0.12–0.13) inputs of osmium to the global ocean. Given the distinctive $^{187}Os/^{188}Os$ compositions of these inputs and the relatively short residence time of Os in the ocean (several tens of thousand years), seawater $^{187}Os/^{188}Os$ compositions are highly sensitive to changes in these fluxes. The Os isotope compositions show a gradual increase in $^{187}Os/^{188}Os$ during the Middle Norian. Two negative Os isotope excursions are observed within a ~2 m stratigraphic interval located between the Middle and the Upper Norian. The onset of the first negative Os excursion is roughly located at the base of the *Epigondolella bidentata* conodont zone in the late Middle Norian. The timing of this Os isotope excursion coincides with both the abrupt increase in Os concentration and low Re/Os ratios, all of which suggest a significant input of extraterrestrial Os into the sediments. The Os isotope compositions exhibit the second negative Os isotope excursion from the initial Os isotope composition of ~0.7 to unradiogenic values of ~0.4 in the early Late Norian. However, it is difficult to specify the cause for the second negative excursion with the dataset acquired in this study. Additional research is needed to clarify the cause for this record in the upper Norian.

Keywords: osmium isotope, chert, Upper Triassic, Mino Belt

