Osmium isotope and PGE signatures of the deep-sea deposits from Japan: Implications for the Late Triassic impact event

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The 34-million-year interval during the Late Triassic is marked by the formation of the several impact craters on the Earth [1]. Late Triassic impact events have been considered as factor in biotic extinction events in the Late Triassic (e.g., end-Triassic extinction events), but this scenario still remains controversial because of a lack of stratigraphic records of ejecta deposits. In order to reconstruct the stratigraphic record of impact events in the Late Triassic, we examined a stratigraphic profile of the marine osmium isotope compositions ($^{187}Os/^{188}Os$) and highly siderophile elements (HSE: Os, Ir, Ru, Pt, Pd, Re) concentrations from Upper Triassic bedded chert successions from Japan.

$^{187}Os/^{188}Os$ ratios of the bedded cherts show two negative excursions within a ~2 m stratigraphic interval between the Middle and Upper Norian. The onset of the first negative Os isotope excursion (~0.126) is almost equivalent to the base of the *E. bidentata* conodont zone in the late Middle Norian. This Os isotope excursion interval exhibits elevated Os concentrations (3.1 ppb) and low Re/Os ratios (~0.03) [2]. HSE concentrations in this layer are three orders of magnitude higher than average terrestrial crustal abundances [3, 4], indicating a significant input of an extraterrestrial materials. The timing of the second negative Os isotope excursion is in the early Late Norian and its isotopic composition shifted to unradiogenic $^{187}Os/^{188}Os$ ratios from ~0.56 to ~0.20. However, HSE concentrations obtained from this layer are almost equivalent to average terrestrial crustal abundances. CI chondrite-normalized HSE pattern shows a pronounced step pattern (low Ir, and high Pt and Pd) similar to those of the upper continental crust. Detailed studies are needed to specify whether this second Os isotope excursion was caused by bolide impact.

[1] Spray *et al*. (1998) *Nature* **392**, 171–173. [2] Sato *et al*. (2013) *Nat. Commun*. **4**, 2455. [3] Onoue *et al*. (2012) *Proc. Natl. Acad. Sci. USA* **109**, 19134–19139. [4] Sato *et al*. (2016) *Palaeogeogr. Palaeoclimatol. Palaeoecol*. **442**, 36–47.