

Marine osmium isotope records during the Carnian (Late Triassic) “pluvial episode” in the pelagic bedded cherts

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The Carnian Pluvial Episode (CPE) is considered as a global environmental change and biotic crisis that occurred during the Carnian (Late Triassic). The climate during the CPE is characterized by a short-lived period of extreme rainfall caused by the maximal development of the Megamonsoon, and an extinction of marine taxa is known to have occurred during uppermost Julian (lower Carnian). Although these events have been considered caused by the Wrangellia Flood Basalt (FB) volcanism, existing studies have found little directly evidence to support this. Here, to clarify the linkage between the eruption of Wrangellia FB and the timing of environmental crises during the CPE, we investigate high-resolution microfossils biostratigraphy and paleo-seawater Os isotope profiles in an Upper Triassic bedded chert succession from the Jurassic accretionary complex of Japan. Our biostratigraphic based on conodonts and radiolarians and osmium isotope data show (i) a continuous decline in the early Julian, (ii) a persistence of lower steady-state in the late Julian, and (iii) an abruptly increase in the end of Julian. The decrease phase of initial $^{187}\text{Os}/^{188}\text{Os}$ ratios throughout the Julian indicates an increased delivery of unradiogenic Os from the eruption of the Wrangellia FB. Moreover, our geochemical data suggest that enrichment factors of the redox sensitive elements, such as V_{EF} and U_{EF} , abruptly increased and recovered in the end of the Julian, which presents first evidence of ocean anoxia in the latest Julian in the pelagic deep-sea Panthalassa. The ocean anoxia in the late Julian has been recognized from widespread deposition of black shales and organic rich marls in from intermediate to shallow water setting of Tethyan sections. Thus, this observation suggest that the ocean anoxia occurred between shallow continental margin and deep-Panthalassa basin at the end of the Wrangellia FB volcanism, and that was likely to have triggered extinction.

Keywords: Carnian Pluvial Episode, Osmium isotope analysis, Late Triassic, Jurassic accretionary complex, microfossils, Geochemistry