Marine Os isotopic change during early Eocene climatic optimum (EECO)

Yasuhiro Kato[1]; Koichiro Fujinaga[1]; Katsuhiko Suzuki[2]

[1] Sys. Innovation, Univ. of Tokyo; [2] IFREE, JAMSTEC

The Mineoka umbers immediately overlying ~52.8 Ma tholeiitic basalts (normal mid-ocean ridge basalt; N-MORB) occur in the Tertiary accretionary complex of central Japan. The umbers that were very likely deposited during the early Eocene climatic optimum (EECO) are ancient counterparts of MOR metalliferous sediments that are plume fall-out ferromanganese precipitates scavenging various seawater-derived elements including P, V, Y, REEs, and Os. Their $^{187}Os/^{188}Os$ ratios gradually increase up-section while fluctuating moderately. The marine $^{187}Os/^{188}Os$ ratio inferred from the Mineoka umbers, ranging from 0.47 to 0.54, was significantly higher than that of the prior period (post-Paleocene-Eocene thermal maximum (PETM); ~0.38 as $^{187}Os/^{188}Os$). This was probably caused by an increase in the chemical weathering rate of continental crust due to the long duration of noticeably warm climate during the EECO. Alternatively, the decline of the North Atlantic rifting and volcanism may have decreased the influx of unradiogenic Os into the global ocean, and consequently led to an increase in the marine $^{187}Os/^{188}Os$ ratio during this interval. A stratigraphic change in the marine $^{187}Os/^{188}Os$ ratio during the EECO interval shows several fluctuations, which may have been caused by short-period climatic changes such as the PETM event.