[JJ] Evening Poster | B (Biogeosciences) | B-CG Complex & General

[B-CG10]Phanerozoic biodiversity change: Extinction and diversification

convener:Yukio Isozaki(Department of Earth Science and Astronomy, Multi-disciplinary Sciences - General Systems Studies, Graduate School of Arts and Sciences, The University of Tokyo), Yusuke Sawaki(The University of Tokyo)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Biotic evolution was the consequence of repeated extinction and following diversification in the past, which was caused by large-scale environmental changes, in particular, by extremely rapid and drastic forcing that changed the environments of the biosphere. Irreversible and episodic changes in material cycling on the planet and in galactic cosmic radiation are nominated as major driving mechanism for the alleged rapid, large-scale environmental perturbations. The biodiversity change in the fossiliferous Phanerozoic record is characterized by 5 major mass extinctions within the long-term trend of diversity increase. Nonetheless, each extinction event has been explained rather in ad hoc manner, without any universal explanation. This session discusses the Phanerozoic biodiversity change under a new light of the recent progress in geology.

[BCG10-P04]Reconstruction of marine Os-isotope record from upper Aptian to lower Albian to shed light on the relationships between Oceanic Anoxic Event 1b and massive volcanic activities

*Hironao Matsumoto[1], Junichiro Kuroda[1], Rodolfo Coccioni[2], Naohiko Ohkouchi[3] (1.Department of Earth and Planetary Science, The University of Tokyo, 2.DiSPeA, University of Urbino, 3.Japan Agency for Marine-Earth Science and Technology)

Keywords:black shale, Cretaceous, OAE1b, Os-isotope ratio

Mid-Cretaceous is a time interval characterized by repeated occurrence of Oceanic Anoxic Events (OAEs), that are recognized by the deposition of organic-rich sediments called black shales. During the latest Aptian and earliest Albian, several organic-rich black shale were deposited in the Tethys and Atlantic Ocean. In particular, four prominent black shale beds have been identified (i.e., Jacob, Kilian, Urbino or Paquier, and Leenhardt levels) as the sedimentary expression of OAE1b. The OAE1b is characterized by the highest extinction rate of planktonic foraminifera (~70%) within the Cretaceous period and its anomalously long duration time (~3.8 Myr). In spite of its enormous impacts on the marine environment and biological evolution, OAE 1b is one of the least studied Cretaceous OAEs.

Recently, detailed studies on marine isotopic records of osmium ($^{187}Os/^{188}Os$) have revealed a direct linkage between massive magmatic episode associated with the emplacement of large igneous provinces (LIPs) and onset of Cretaceous OAEs. For example, Tejada et al. (2009) and Turgeon and Creaser (2008) demonstrated that the onset of the early Aptian OAE1a and end Cenomanian OAE2 were synchronous to the sharp decreases in $^{187}Os/^{188}Os$ ratio to the typical mantle endmenber. These decreases were interpreted as the increase in the relative supply rate of unradiogenic Os from the LIPs activities. Since the stratigraphic interval representing OAE1b (~113-109 Ma) is close to the ages of the igneous rocks from the Kerguelen Plateau in the Indian Ocean (~120-95 Ma), their causal relationship has also been suggested. However, direct evidence using $^{187}Os/^{188}Os$ ratio has been lacking so far. In this study, we

present marine Os isotopic evolution during the late Aptian and lower Albian to evaluate the impact of massive volcanisms on OAE1b.

We collected pelagic sedimentary rock samples deposited in the Tethys Ocean, from the Poggio le Guaine section, Italy, which is one of the most complete and best-documented OAE1b site (Coccioni et al., 2014). The upper Aptian to lower Albian interval of this section comprises reddish brown to olive argillaceous limestones, marlstones, and mudstones with several cyclically alternating black shales, some of which have been identified as the sedimentary expression of OAE1b. We measured $^{187}Os/^{188}Os$ ratio and stable carbon isotope ratios of these sedimentary rock samples at Japan Agency for Marine-Earth Science and Technology (JAMSTEC). We will present our recent results.

References:

Coccioni, Rodolfo, et al. Stratigraphy 11.3-4 (2014): 245-282

Sabatino, Nadia, et al. Palaeogeography, Palaeoclimatology, Palaeoecology 426: 319-333.

Tejada, Maria Luisa G., et al. Geology 37.9 (2009): 855-858.
Turgeon, Steven C., and Robert A. Creaser. Nature 454.7202 (2008): 323.