Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS25-P02 Room:Poster Time:April 28 18:15-19:30

Sedimentation rate of the end-Permian to earliest Triassic black claystone strata in the Panthalassic deep-sea

TAKAHASHI, Satoshi[1*] ; YAMAGUCHI, Asuka[2] ; YAMAKITA, Satoshi[3] ; MIZUTANI, Akane[1] ; ISHIDA, Jun[1] ; YAMAMOTO, Shinji[1] ; IKEDA, Masayuki[4] ; OZAKI, Kazumi[2] ; TADA, Ryuji[1]

[1]Department of Earth and Planetary Science, the University of Tokyo, [2]Atmosphere and Ocean Research Institute, the University of Tokyo, [3]Department of Earth Science, Faculty of Culture, Miyazaki University, [4]Department of Earth Sciences, Graduate School of Science and Engineering, Ehime University

The greatest mass extinction occurred at the end-Permian, its aftermath continued during following Early Triassic. This period, especially interval between the end-Permian and Induan is characterized by occurrences of the black claystone in the pelagic deep-sea depositional area where now locate in Japan and western North America etc. This black claystone generally contains high organic matter and few silicic fossils, in contrast that bedded chert before the mass extinction event has few organic matter and abundant radiolarian tests. Detailed background of this black claystone has not been fully understood due to the scarcity of well-preserved lithologic sequences. Herein, we show preliminary achievement on continuous black claystone strata based on the one of most continuous Permian-Triassic Boundary section (Akkamori-2 section; Takahashi et al., 2009).

We polished the outcrops of the study section using hand grinders with diamond-blades and diamond-polishing pad for observation of sedimentary facies and structures. Observing the outcrop, structural geology examination was conducted (See Yamaguchi et al. in this session). Using their results, we divided the outcrop into 20 subsections that preserve continuous lithologic stratigraphy. Then, high-resolution lithologic column was reconstructed from these subsections.

After careful observation on the polished surface of the outcrop, we found many key bed layers. For instances, dolomitic layers, light and dark grey colored siliceous claystone interbeded within black claystone, and alternations of black and grey colored claystones. Using these key beds, we correlated the lithologic columns from each subsection. In the case of that useful key beds were not found, we simply built the columns up, because no duplication of strata was recognized. After these processes, totally ca. 10 m thick lithologic column of black claystone was reconstructed. Its lower most horizon accords to carbon isotopic negative excursion (Takahashi et al., 2010) coinciding with the main mass extinction event, ca. 252.2 Ma (U-Pb dating by Shen et al., 2011). Meanwhile, in the thick grey-color siliceous claystone horizon from uppermost part of the strata, conodont fossils of Neospathodus waageni and Eurygnathodus costatus were recovered. This combination indicates lowest Smithian. After interpolation by Geologic Time Scale 2012 (Gradstein et al., 2012), beginning of Smithian (end of Induan) is ca. 250.0 Ma. Using these absolute ages, sedimentation rate of black claystone is calculated 4.34mm/kyr (= 10000 mm /2300 kyr). This calculation is still comprehensive. Also, we can calculate the sedimentation rate in another way using the earliest Triassic conodont occurrence of Hindeodus parvus in the 7.5 m above the base of black claystone. The first occurrence horizon is estimated to be 252.3Ma in the type section of Permian-Triassic Boundary (Shen et al., 2011). The calculated sedimentation rate of black claystone in this way is 7.5 mm/kyr (750 mm/100 kyr). As the fossil age is uncertain between the basal 7.5 m interval, this is a maximum estimation. These two results of sedimentation rate indicate that the black claystone beds were accumulated in several millimetres per a thousand year. This rate is in similar class of sedimentation rate of radiolarian chert deposited before and after the black claystone deposition. In fact, recent study of Ikeda et al. (2010) concluded several centimetres thick one chert-clay couplet accords about 20 kyr. The sedimentation rate of the black claystone as similar as silicic fossil rich bedded chert before mass extinction event implies that some materials increased into the pelagic deep-sea at and after the extinction event instead of significantly decreased radiolarian tests (Takahashi et al., 2009). Possible materials are terrigenous clastic material (Algeo and Twitchett, 2009; Sakuma et al., 2012) and very fine silicic biotic crust (such as silicic sponges).

Keywords: Permian, Triassic, pelagic deepsea, black claystone, mass extinction