Redox changes in deep-sea environment during the Early Triassic based on pelagic sequence in Inuyama area

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After the most severe mass extinction event in the Phanerozoic at the Permian/Triassic (P/T) boundary, the biotic recovery from the extinction required about 5 Myr that correspond to the entire Early Triassic. Recently, it was suggested that there was continuous carbon cycle instability characterized by large amplitude carbon isotopic oscillations during the Early Triassic, which was reported from shallow-marine carbonates deposited in tropical Tethys. This suggests a causal relationship between unstable carbon cycle and delayed biotic recovery. To examine causes of carbon isotopic oscillations and explore the relationship between the global carbon cycle instability and biotic recovery, however, it is important to obtain the information about superocean Panthalassa which occupied the great majority of the world ocean, and to compare it with the information obtained from shallow marine environments.

In the present study, we carried out detailed geological mapping of the Jurassic accretionary complex in Mino Belt exposed along Kiso River, Inuyama, central Japan to reconstruct the continuous lithostratigraphy of the Lower Triassic pelagic sequence. We reconstructed a continuous columnar section of about 12m-thick that is composed of 14 lithologic units by correlating and stacking columnar sections made for individual fault-bounded blocks. Radiolarian index fossils of the late Early Triassic (Spathian) and the early Middle Triassic (Anisian) were previously reported from the upper part of this sequence, and the lower black shale unit is considered to be corresponding to the Earliest Triassic judging from its lithostratigraphic association. Carbon isotopic analysis of total organic carbon was conducted to reconstruct continuous carbon isotopic record covering the entire Early Triassic and compared with inorganic carbon isotopic record from Tethys. On the basis of this correlation, we can compare environmental changes between shallow and deep-water environment which were related with carbon isotopic oscillations. We will demonstrate redox changes on the deep-sea floor during the Early Triassic based on the observation of sedimentary structure on X-ray radiographs and geochemical analyses, and discuss the relationship between carbon isotopic oscillations and environmental changes in shallow and deep-water.