Reconstruction of oceanic redox conditions in the Lower Jurassic (Pliensbachian–Toarcian) pelagic deep-sea bedded chert sequence of the Mino Belt, central Japan

*Katsuhito Soda[1]

1. Department of Earth and Environmental Sciences, Faculty of Science, Kumamoto University

The Pliensbachian-Toarcian interval in the Early Jurassic is characterized by a second-order marine mass extinction and remarkable worldwide palaeoenvironmental perturbations associated with the early Toarcian oceanic anoxic event (T-OAE). However, oceanic redox conditions and palaeoceanographic processes for redox sensitive elemental accumulation are unclear in the pelagic deep-sea realms of the Panthalassic Ocean. Here we show geochemical and multivariate statistical analyses in the pelagic deep-sea sedimentary rocks of the Panthalassic Ocean during the Pliensbachian-Toarcian. Three principal components (PC1, PC2, and PC3) in the redox sensitive elements explained 88.64% of the total variance. The PC1 represents the comprehensive redox variations, whose stratigraphic variations show euxinic-anoxic conditions across the Pliensbachian/Toarcian (Pl/To) boundary layer and the classical T-OAE. The PC2 depicts the sorption processes of Fe-Mn oxide minerals with transition elements, whose stratigraphic variations suggest few drawdowns of the transition elemental inventory after the Pl/To boundary layer. The PC3 delineates the active particulate shuttles by Fe (-Mn) oxide minerals, whose stratigraphic variations indicate the strong activation between the Pl/To boundary layer and the classical T-OAE. The statistical extraction of both the PC1 and the PC3 support the characteristic phenomena in the pelagic deep-sea realms of the Panthalassic Ocean under the relatively strong reductive conditions.

