Marine ecosystem across the Cenomanian-Turonian boundary reconstructed by biomarker analysis

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The period around the Cenomanian-Turonian boundary (CTB) is well known to be one of remarkable climatic optimum during the Phanerozoic [2]. Sedimentary horizons across the CTB are characterized by positive excursion of stable carbon isotope ratio related to the Oceanic Anoxic Event (OAE) 2. By chemo- and biostratigraphic investigations, the CTB intervals were recognized in several Pacific regions other than the Tethys and proto-Atlantic. In the present study, we compare marine ecosystems across the CTB between Hokkaido area, Japan (NW Pacific) and the Vocontian Basin, SE France (Tethys) by biomarker analysis of sedimentary rocks.

Lower values of 2-methyl hopanoid index (2-MHI) are indicated by the sediments of Hokkaido area and Vocontian Basin. Contribution of 2-methyl hopane-producing cyanobacteria such as Synechococcus in marine production were minor in these two regions, which are different from the 2-MHI trends in some proto-Atlantic region. On the other hands, two increasing spikes of triaromatic dinosteroid index (TADS), which is dinoflagellate productivity proxy, are observed in the sediments from both Hokkaido and Vocontian Basin. The timings of these spikes correspond to those of global warming maximal ones estimated by TEX_{86} [1]. Extremely warm condition enhanced dinoflagellate production in different two sections at the NW Pacific and Tethys. In the central proto-Atlantic, N_2-fixing cyanobacteria increased and transported ammonium ion to the other regions through intermediate water [4]. Subsequently, collapse of vertical stratification during the warm phase of the OAE2 [3] globally enhanced nutrient supply to surface water mass. Finally, eutrophic condition suitable for dinoflagellate rather than cyanobacteria was extensively expanded not only the Tethys but NW Pacific around the CTB.

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