

Short-term environmental disturbance of early Turonian (Cretaceous) in southern high latitude : Insights from organic geochemistry

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An environmental change of the Early Turonian, Cretaceous was investigated using the samples from IODP Exp. 369, U1512. A stable carbon isotope stratigraphy based on bulk rock analysis showed a positive 3 ‰ carbon isotope excursion (CIE) within the lower Turonian. Based on this high isotopic value and the biomarker composition, phytoplankton blooming is interpreted to be a factor that caused the CIE.

During Turonian (93.9-89.8±0.3Ma), which is the target of this study, temperature as warm as ~30°C was suggested by some previous studies and physical simulation even in the high latitude regions. Turonian is an age of recovery from major environmental changes after the disturbance of the carbon cycle by Oceanic Anoxic Event 2 (OAE2: Cenomanian/Turonian boundary event). Site U1512, in Great Australia Bight, was located around the paleolatitude about 60 °S during Early Turonian. The site is expected to provide new paleoenvironmental information and add important geologic records of paleoenvironments. In this study, a positive 3‰ carbon isotope excursion (CIE) in the lower Turonian is investigated as it should be a signal of paleoenvironmental change and perturbation.

Additional denser samples were taken across the CIE to obtain the exact magnitude and duration of the CIE. It emerged that the time interval of the CIE was about 4-20 thousand years. Compound-specific carbon isotope analyses were also performed on selected samples across the CIE. The carbon-isotopic profile of *n*-alkanes did not replicate that of the bulk organic carbon indicating the CIE observed with the bulk analyses is not comparable to that of OAE2, and rather ascribed to a change in origin of organic matters and their mixing rate. Biomarker analysis at the CIE horizon revealed that compounds from marine plankton (C₂₇diacholentenes, ≲ *n*-C₁₈ *n*-alkane) dominated relative to the terrestrial ones. Higher isotopic value of bulk organic carbon in the CIE horizon can be ascribed to smaller carbon isotopic fractionation of phytoplankton during blooming. Based on these results, phytoplankton blooming is interpreted to be a most plausible factor for the CIE.

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