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Multi-biomarker analyses of the Paquier level deposited during the Cretaceous OAE1b in the Vocontian Basin, SE France.

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Black shales were occasionally discovered in the mid-Cretaceous formations, and depositions of these sediments are closely associated with the expansion of oxygen-poor water in the ocean, called the oceanic anoxic events (OAEs). In this study, the biomarker analyses of the black shales corresponding to the OAE1b (the Paquier level) from the Vocontian Basin of SE France are carried out in order to reconstruct the changes of environmental systems and marine ecosystems, and to elucidate the mechanism for expansion of anoxic waters during this OAE.

In the Paquier samples, the terrestrial higher plant biomarkers such as the retene and the dibenzofuran are abundantly identified. The concentrations of these biomarkers are relatively low in the Jacob level, but high in the middle part of the Paquier level. Moreover, the concentrations of marine algal biomarkers such as steranes and dinosteranes are high in the Paquier levels. These trends are similar to those of terrestrial biomarker concentrations, which indicate that the nutrient was transported from land to ocean. In the Paquier level the archaeal biomarkers such as 2,6,15,19-tetramethylcosane (TMI) and 2,6,10,15,19-pentamethylcosane (PMI) are detected. Carbon isotope ratios of TMI and PMI range -35 to -20permil, suggesting that these biomarkers are originated from methanogenic archaea. Thus, these expansions of methanogenic archaea during the Paquier levels were possibly related to the intensification of anoxic condition. As mentioned above, the deposition of black shales are strongly related to terrestrial input. In addition, the variations of dinoflagellate and cyanobacteria productions were reconstructed by using aromatic dinosteroids and hopanoids in the Paquier level.

Keywords: Oceanic Anoxic Event (OAE), Cretaceous, paleo-ecosystem, biomarker, supply of terrigenous material