Deep-sea Circulation Turnover Recognized in the Transition Period from the Warm Period to the Cool Period in the Cretaceous

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Intoroduction

Globally warm climates occurred during the mid-Cretaceous. Especially, oceanic anoxic event 2 (OAE 2) was caused by extreme warmth in the latest Cenomanian to earliest Turonian [1, 2, 3]. Global climate was gradually getting cool just after OAE 2. Although deep-sea circulation is related to global climate, this relationship remains unclarified in the Cretaceous. This paper reconstructed deep-sea circulation during the middle to late Cretaceous using carbon and oxygen isotopes from benthic foraminiferal tests at 1,000–2,000 m paleowater depth in the Pacific, Indian, North Atlantic, South Atlantic, and Southern Oceans.

Discussion

The carbon isotope data showed that the water masses in the Pacific and Indian Oceans were newer than those in the North Atlantic during the early Cenomanian and Coniacian, but the reverse occurred during the OAE 2, the mid-Campanian, and the Maastrichtian. Deep-sea temperature determinations based on the oxygen isotope data showed that the reverse of the global deep-sea circulation characterized the transition from the warm to the cool period. Based on the current understanding of the relationship between deep-sea circulation and temperature during the Paleocene-Eocene Thermal Maximum, the sources of the warm-water circulation culminated at the OAE 2 whereas the cool-water circulation derived from the middle-low latitudes and high latitudes.

[1] Schlanger & Jenkyns (1976) *Geol. Mijnbouw* **55**, 179–184. [2] Huber *et al.* (2002) *Geology* **30**, 123-127. [3] Wilson *et al.* (2002) *Geology*, 607-610.