

The climate shift around 4.2ka: evidence
from the inner shelf mud belt, China

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Recently, the Holocene was subdivided into 3 stages; Meghalayan (late-Holocene), Northgrippian (mid-Holocene), and Greenlandian (early-Holocene). The boundary of Meghalayan and Northgrippian was prescribed as 4.2ka, when numerous Neolithic civilizations in the world collapsed due to the abrupt climate change, called 4.2ka event. However, its cause and range of influence has not been clarified yet.

We analyzed the sedimentary core (MD06-3040) recovered from the inner continental shelf off the coast of the Yangtze delta area. C₃₇ alkenone unsaturation index (U^k_{37'}) provided the evidence of severe cold climate around 4.2ka, which might be related with the collapse of the Liangzhu culture in the Yangtze delta. The alkenone temperature during the Northgrippian periodically fluctuated by 1~2°C, while the temperature during the Meghalayan was stable except for the Little Ice Age. The results from geochemical and paleomagnetic analysis indicated oxygen-poor and eutrophic condition in the Northgrippian, and oxygen-rich and oligotrophic condition in the Meghalayan. These results suggested that the coastal upwelling along the coast of Yangtze delta became weaker in the Meghalayan compared to the Northgrippian. The coastal upwelling is strongly controlled by the East Asian Monsoon and El Niño Southern Oscillation. Therefore, it was assumed that global climate system had been shifted around 4.2ka as a boundary.