

Rapid sea-level fall during the earliest phase of Marine Isotope Stage 19 in Osaka Bay, Japan

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Marine Isotope Stage (MIS) 19 is climatologically important as an orbital analogue of the Holocene, besides its stratigraphic importance as a candidate for the Early-Middle Pleistocene boundary. We conducted diatom analyses of marine clay sediments in the 1700-m core of the Osaka Group to estimate sea-level changes during MIS 19. The marine condition and diatom assemblages in Osaka Bay are strongly affected by eustatic sea-level change. The homogeneous fine clay sediment and its high average accumulation rate (63 cm/kyr) can yield millennial to centennial scale sea-level changes. Variations in diatom assemblages are classified into four ecological categories ; marine, marine-brackish, brackish, and freshwater. Marine taxa define marine zone, ranging in depth from 405.60m to 390.62 m. Diatom assemblages clearly show precession-related signals for two sea-level highstands correlated with MIS 19.3 and 19.1, and a lowstand with 19.2, respectively. In addition, we found a rapid sea-level fall event in the earliest phase of MIS 19. This event suddenly began at a depth of 403.88 m with rapid decrease in marine-planktonic diatoms, and strong increases in marine-benthic and freshwater-planktonic diatoms, followed by a relatively gradual recovery to the pre-event levels at a depth of 403.27m. An astronomical age model shows its duration of 783ka-782ka. We examined benthic marine oxygen isotope records from deep-sea and coastal marine sediments, some of which have a signal comparable to the sea-level fall event in the earliest MIS 19, suggesting the temporal expansion of global ice sheet. The rapid sea-level fall during the period concerned may reflect a global event.

Keywords: sea-level change, Marine Isotope Stage 19, Middle Pleistocene Transition, diatom, Osaka Group, Matuyama-Brunhes Transition