海洋酸素同位体層序とよい対応を示す大阪湾の中期更新世の海水準変動

Middle Pleistocene sea-level variations in Osaka Bay well correlated with marine oxygen isotope stratigraphy

*吉住 正斗[1]、廣瀬 孝太郎[1,2]、兵頭 政幸[1,2]、佐藤 裕司[3]
*Masato Yoshizumi[1], Kotaro Hirose[1,2], Masayuki Hyodo[1,2], Hiroshi Sato[3]

1.神戸大学大学院 理学研究科 惑星学専攻、2.神戸大学 内海域環境教育研究センター、3.兵庫県立大学 自然・環境科学研究所
1.Dept. of planetology, Kobe Univ., 2.Research Center for Inland Seas, Kobe Univ., 3.Institute of Natural and Environmental Sciences, Univ. of Hyogo

The Osaka Group consists of Plio-Pleistocene sediments continuously deposited in the Osaka Basin. It mainly consists of freshwater deposits in the lower part, and alternating marine and freshwater layers in the upper part. Each marine layer has been designated as Ma-1, Ma0, Ma0.5, Ma1, etc, and correlated with interglacial highstands. However, marine layers Ma6, Ma7, and Ma8 possibly correlated with Marine Isotope Stages (MISs) 15 and 13, have not been studied well and correlations with MISs are obscure because of low amplitude precession-related signals for marine isotope data. Recent studies revealed many marine clay layers defined based on lithology are partly lacustrine. In this study, we examine sea-level changes with diatom and sulfur analysis of Ma6, Ma7, and Ma8 in the Osaka Bay 1700-m core (GS-K1 core) to construct more detailed and precise correlations with eustatic sea-level changes. The aquatic environment and diatom assemblages in Osaka Bay are strongly affected by eustatic sea-level changes through the Kitan Strait, and also by a huge amount of freshwater from the Yodo River. Diatom taxa were grouped into five ecological categories according to salinity tolerance: marine, marine-brackish, brackish, brackish-freshwater, and freshwater. We adopt 3 per mil of sulfur contents to empirical criterion which defines a marine/freshwater boundary. Parts of Ma6 defined in the previous study are lacustrine. The thickness of marine interval is 27.6 m, which is 0.8 m shorter than before. In the lower part of new Ma6, we found a single sea-level highstand correlated with MIS 15.5. The upper part has a zone of no diatoms. However, this zone is marine because it has high sulfur content over 3 per mil. In Ma7, marine interval is newly defined to be 13.9 m thick, which is 5.4 m shorter than the previous one. In the center of new Ma7, we found a single sea-level highstand correlated with MIS 15.1. Between the new Ma6 and Ma7, we found a lacustrine layer of 3.2 m thick that can be correlated with MIS 15.2. We also investigated Ma8, and found Ma8 splits into two marine intervals, probably caused by desalination due to eustatic sea-level fall correlated with MIS 13.2. A tentative astronomical age model shows an average accumulation rate for MIS 15 is 0.86 m/ka, which is much higher than an average for the middle Pleistocene (0.52 m/ka). The high accumulation rate may reflect that tectonic activities including uplifting in mountain areas and subsidence in the basin became high during MIS 15 (621-576 ka) in the Kinki District.

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