

Biomarker analysis of the uncorrelated Early-Pleistocene marine clay layer of the Osaka Group in the Kishiwada City, Osaka Prefecture

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The Osaka Group is characterized by thick sedimentation of Plio-Pleistocene sediments (>2000 m in the basin center) due to rapid subsidence. The lowest part of the Osaka Group is freshwater deposits consist of sand, silt and mud, which frequently intercalated with gravel layer. In the lower to the upper part of the Osaka Group, marine clay layers repeatedly deposit spanning wide area of the Osaka Basin, and has been given symbols as Ma-1, Ma0, Ma1...up to Ma-13. Deposition of marine clay layers are affected by eustatic sea-level changes, and the Ma-1 is considered to be the earliest significant marine incursion through the Kii Channel into a large area of Osaka Basin. Recently, fresh outcrop including unidentified marine-like clay layer (MLC) was newly exposed near the Tonboike Park, Kishiwada City. This MCL is presumed to be older than Ma1, however, have not been correlated to the certain known marine clay layer due to a lack of key bed within the outcrop.

In order to examine the source of organic matter and to reconstruct the changes in depositional environment during the possible sea-level rise event, sediments including MCL layer were collected from the outcrop and analyzed for biomarker compositions. Composition of long-chain diols in the upper part of the MCL layer was characterized by a predominance of C₃₀ diols over C₃₂ diols, which correspond to the central to inner part of the recent Osaka Bay. In contrast, the lower part of MCL was rich in C₃₂ diols indicating significant influence of freshwater input. Underlying fluviolimnic sediments were characterized with the predominance of C₃₂, 1,15-diol indicating freshwater environment. Steroid compositions (the relative amount of C₂₇, C₂₈, C₂₉ stanols) indicated the varying input of terrestrial to aquatic organic matter, which is concordant with both the results of long-chain diols and the lithofacies observation. The *n*-alkane index TAR reconstructed variation in the contribution of aquatic OM along with continual input of terrestrial plant wax. In addition, elevated Paq value was noted at the lower part of the MCL. The combination of multiple biomarker indices suggests that (1) the upper part of the marine like clay layer is deposited under marine environment, and (2) potential development of the blackish aquatic environment with high input of aquatic macrophytes at the earliest stage of the history of Osaka Bay marine environment before the typical marine mud layer deposition.

Keywords: Long chain diols, n-alkanes, Osaka Group, Sedimentary environment, Marine clay