Supplementary Text

Characteristics of sedimentary facies and their depositional environments are shown as follow (see Shirai and Tada, 2000 for more details).

Facies A consists of black, thinly laminated lignite layers, with occurrence of tree stumps. Facies A in some places shows a slump structure. Facies A was formed in a coastal-plain swamp (0–20 m above sea level).

Facies B consists of dark gray, poorly sorted, massive or laminated, carbonaceous siltstone, with intercalations of light gray, poorly sorted, laminated, very coarse- to medium-grained sandstone. Carbonaceous siltstone beds in some places show a slump structure. The sandstone generally shows trough cross-lamination, and epsilon cross bedding occurs at the base of a channel-filling sandstone layer. The siltstone was deposited in a floodplain, and the sandstone was formed in a river-channel crossing a floodplain (0–20 m above sea level).

Facies C consists of bluish-gray, well-sorted, parallel-laminated to massive, carbonaceous claystone which contains shells of *Corbicula japonica* and seeds of *Trapa* sp. (Kato and Watanabe, 1976). The facies was deposited in calm-water, marginal marine conditions, such as a salt marsh (approximately 0 ± 1 m).

Facies D consists of brownish-gray, poorly sorted, fine-grained, silty sandstone which is characterized by bioturbation and an absence of intercalated gravels. Shells of *C. japonica* occurs (Kato and Watanabe, 1976). Drift pumice occurs in two horizons (Shiraishi et al., 1992). The facies D was formed in a lagoon or a bay (water depth = 0–10 m).

Facies E consists of brownish-gray, well-sorted, very fine- to fine-grained sandstone which shows a repetition of parallel-laminated layers and ripple or planar cross-laminated layers. Fine-grained magnetite and pumice grains form thin lamina. Parallel lamina sets often form wedge-shaped cross-bedding. The overall depositional environment of facies E was a beach, on the backshore to upper shoreface (water depth = 0–10 m, above the fair-weather wave base). We additionally described variation of facies E from Wakimoto area as follow. Brownish-gray poorly-sorted fine- to medium-grained sandstone with rootlet was interpreted as deposition at the foreshore to backshore (e.g., Nishikawa and Ito, 2000). In addition, brownish-gray, well-sorted medium- to coarse-grained sandstone with dense occurrence of *Macaronichnus segregatis* is considered to be formed at the foreshore (e.g., Seike, 2009).

Facies F consists of brownish-gray, moderately sorted, parallel-laminated, fine-grained sandstone with intercalations of brown, bioturbated zones. The facies F deposited at the middle to lower shoreface (water depth = 10–20 m).

Facies G\* consists of bluish-gray poorly-sorted carbonaceous sandstone associated with hummocky cross-stratification. The facies G\* was deposited at wave-influenced coastal lagoon or enclosed bay (water depth < 60 m).

Additional references of Supplementary Text

Nishikawa, T., Ito, M., 2000. Late Pleistocene barrier-island development reconstructed from genetic classification and timing of erosional surfaces, paleo-Tokyo Bay, Japan. Sedimentary Geology 137, 25–42.

Seike, K., 2009. Influence of beach morphodynamics on the distributions of the opheliid polychaete *Euzonus* sp. and its feeding burrows on a sandy beach: paleoecological and paleoenvironmental implications for the trace fossil *Macaronichnus sergegatis*. Palaios 24, 799–808.