Geomorphic development from MIS 6 to the last interglacial in the inner paleo-Tokyo Bay based on sedimentary facies analysis of multiple drilling cores

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The Kanto Plain is one of the tectonic basins in Japan for the late Quaternary the most advanced studies on topographic development, but in the southern Kinugawa lowland near the sinking center of the Kanto basin movement (Kaizuka 1987), the paleogeography before the last glacial is little known. In this study, the paleogeography from MIS 6 to the last interglacial was clarified in the vicinity of the sinking center of the Kanto basin based on the sedimentary facies analysis of the drilling cores excavated in the Takaragi terrace in the southern Kinugawa lowland. To three all-cores (core diameter: 65 mm) drilled on the Takaragi surface : GC-NG-1 (hole elevation: 20.57 m; excavation depth: 74.60 m), GC-OY-1 (29.45 m; 90.00m), GC-OY-2 (34.01m; 86.00m), observation and description, particle size analysis by laser diffraction device, elemental analysis by WD-XRF, magnetic susceptibility measurement, chemical analysis of tephra volcanic glass with SEM-EDS was performed. As a result of the analysis, the core was divided into the following 15 units toward the depth. In this presentation, Unit5-8 are focused on.

Unit8: Andesitic sub-rounded to rounded gravels. The thickness and maximum diameter of gravel are 5.71m and 70mm for GC-OY-2, 4.87m and 60mm for OY-1, and 2.88m and 50mm for NG-1. The height of this layer goes down to the southward, with the slope of about 2 ‰.

Unit7: Sand-silt alternating layer with finer grains. Lamina developed in the sand layer, and biological disturbance and organic materials are observed in the silt layer.

Unit6: Mud layer including shell fragments. Oyster reefs occupy this unit of OY-2 core.

Unit5: Coarsening upward sand layer containing shell fragments. Lamina and biological disturbance are often observed.

In Units 7, 6, and 5, the layer thickness decreases northward in the order of GC-NG-1, OY-1, and OY-2. At the top of these units, as will be reported by Kimori et al. (2020), Units 4 and 3, composing Takaragi terrace levels, and Unit1 of the aeolian layer are superimposed.

The paleogeographic change from MIS 6 to MIS 5e in this area is estimated as follows.
In the low sea level period of MIS 6, the incision progressed downstream of the paleo-Kinu River, the riverbed became steep, gravel was transported, and a braided river sediment (Unit 8) was deposited at the bottom of the valley. With the transgression during the last interglacial period, the sediment accumulating area shifted inland, the braided river bed changed to a flood plain or tidal flat (Unit 7), and the grain size of the sediment became finer. In the south of NG-1, the estuary-tidal flat environment lasted longer and Unit 7 was thickly deposited. When the rise of the riverbed could not keep up with the rise of the sea level, the paleo Tokyo Bay invaded to the north and the inner bay mud layer (Unit 6) was deposited. The oyster reefs accumulated in Unit 2 of GC-OY-2 suggest that they had submerged around the time of the

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maximum transgression. When the rate of sea level rise decreased and sediment supply by the river became dominant, the delta front sand layer (Unit 5) began to migrated downstream and the coastline moved to the south. In GC-OY-2, the layer thickness of Unit5 is about only 2 m, and the water depth at the time of submersion is estimated to be about the same. The thickness of Unit 5 increases toward NG-1 via OY-1, suggesting that the water depth of the paleo Tokyo Bay was also deeper toward the south (i.e., depocenter of the Kanto tectonic basin). The response of the paleo-Kinu river systems to sea level change from MIS 6 to MIS 5e is considered to be very similar to the response of the Estuary-Delta system known from MIS 2 to MIS 1 in many alluvial lowlands in Japan. Acknowledgment: This study was carried out under a contract with METI (Ministry of Economy, Trade and Industry) as part of its R&D supporting for developing geological disposal technology.

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