Distribution map of subsurface Late Pleistocene fluvial terraces in the lower Sagami Plain, central Japan

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The lower Sagami Plain is a fluvial plain facing Sagami Bay, central Japan, with about 15 km width and 33 km length, and bounded by the Oiso and Tama Hills and Tanzawa Mountains. In this plain, there are many Middle to Late Pleistocene fluvial terraces, Sagamihara, Nakatasuhara, Tanahara and Minahara Terraces from older to younger, which had been formed by Sagami River depending on sea level fluctuations (Oya et al., 1991; Kubo, 1997). These terraces are distributed beneath alluvial lowland toward downward from about 15 km from the present coastline. Although general distribution of them is shown by Kubo (1997), there is few quantitative analyses using bore hole logs. In this study, we attempt to show distribution of buried terraces based on the result of interpolation on bore hole logs and drilled core samples (Sato et al., 2017).

Bore hole longs were collected from local governments and government agencies. We identified alluvial base, which is not only the top of alluvium base gravel but top of volcanic loess (Kanto Loam) overlying buried terrace, and thickness of loam layer with help of grain size, N value and distribution pattern shown in cross sections. As a result, 3,890 and 2,033 elevation of bore hole logs were obtained for alluvial basement and Kanto Loam layer thickness respectively. Spatial interpolation was performed using the Kriging method on these elevation data with ArcGIS 10.3.1. Grid size of interpolation was ~140 m. Based on distribution pattern and differences in thickness of Kanto Loam layers, we demonstrated the dissected incised valley and buried terraces.

Thickness of Knato Loam layer overlying subaerial fluvial terrace surface, shown by Kubo (1997) and so on, was estimated from boring data and shown their frequency distribution. As a result, there is a significant difference in the average value between the terraces. In addition, the frequency distribution indicate that thickness of Knato Loam layer is 13–20 m for Sagami Terraces, 7.5–13 m for Nakatsuhara Terraces, 3.5–7.5 m for Tanahara Terraces, and 0–3.5 m for Minahara Terraces. We referred conveniently these values as the typical thickness of Knato Loam layer of each terrace for comparison.

Based on distribution pattern of buried flat surface of alluvium basement and thickness of loam layer, we dissected incised valley and buried terrace of Sagami River. The incised valleys are distributed along the eastern margin of the present alluvial lowland with slightly meandering. It is presumed that the paleo-Sagami River Valley joined the paleo-Kaname River Valley in southern part of the plain, and then flowed south to southeastward into the Sagami Bay. Although distribution of buried fluvial terraces is almost consistent with Kubo (1997), following two points were newly suggested; the Minahara Terraces may be distributed more widely, wave cut terraces are distributed widely along the Kaname River. Longitudinal riverbed section estimated from bore hole logs indicate that elevation of the Minahara Terrace is presumed to be about −110 m around the southern margin of the plain, which suggesting approximately the sea level during the formation period of this terrace, at least after AT tephra (29-30 ka) and before the Last Glacial Maximum (ca. 20ka) (Kubo, 1997). This suggestion is consistent with estimated value of global eustatic sea level during 20–30 ka, about −110 m (Yokoyama et al., 2018).

Reference

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