

Subsurface distribution of marine deposits during the MIS 5e and vertical displacement inferred from microfossil evidences and borehole logs in northern Ise Plain, central Japan

*Yoshiki Sato¹

1. Advanced Industrial Science and Technology, Geological Survey of Japan

This study identified Marine Isotope Stage [MIS] 5e marine deposits inferred from borehole logs, diatom and pollen fossil analyses and radiocarbon ages for estimation of vertical displacement in the northern Ise Plain, western coast of the Ise Bay. Late Pleistocene marine and riverine terraces are distributed widely in the northern Ise Plain (Ishimura, 2013). In the northern Ise Plain, active faults, including the Yoro-Yokkaichi Fault Zone and Eastern margin Fault Zone of Nunobiki Mountains, are distributed at the boundary between Pleistocene terraces and alluvial lowland. Although the study area, southern part of Suzuka City, is located at the boundary of both fault zones, activity and tectonic relationship of them are unclear. Therefore, we performed geomorphological classification by interpretation of aerial photos, analyses of borehole logs, diatom and pollen fossils to identify MIS5e marine deposits.

Late Pleistocene terraces, middle and lower, are distributed in the study area, which was deformed in their eastern margins by active faults. The top of middle terraces has 5 to 15 m T.P. and corresponding to older middle terrace (tm1) of Yoshida (1987) and Kambe terrace (tmk) of Yoshida (1984). The eastern margin of middle terrace around the Ozaga-ike pond shows flexure structure, indicating that active faults are distributed at the boundary between the middle terrace and alluvial lowland.

Late Pleistocene deposits were able to be divided into three units, Unit A to C in ascending order, and the Unit B subdivided into four subunits (B-1 to 4). Unit A is composed of solid sandy and muddy deposits with freshwater diatom species, which suggesting that this unit is a part of Pliocene Tokai Formation. Unit B is composed of alternated layers of muddy and sandy sediments; Subunit B-1: marine muddy sediment, Subunit B-2: sandy sediments, Subunit B-3: freshwater muddy sediments with abundant freshwater diatom species and plant materials showing radiocarbon ages of $50,440 \pm 760$ yrBP and $>53,940$ yrBP, Subunit B-4: gravelly sediments, corresponding to surface gravelly deposits of the middle terraces. Unit C is alluvium deposits, soft and humic muddy deposits. The subunit B-1 has abundant brackish to marine water diatom species and Lagerstroemia pollen, suggesting that this unit deposits during the MIS 5e.

The distribution pattern of MIS 5e marine deposits, subunit B-1, is possible to indicate vertical displacement since the MIS 5e, ~ 120 ka. Elevation of the top of the subunit B-1 is ~ -13.5 to -15.5 m T.P. in western side of the presumed fault, and ~ -17.5 m T.P. in eastern side. Therefore, vertical displacement is estimated to be more than 2 m, and vertical slip rates since the MIS 5e are suggested to be 0.02 m/kyr. In addition, the bottom of the subunit B-3 suggest that vertical displacement is more than 6.5 m, and vertical slip rate is more than 0.05 m/kyr. There estimated values is similar to the slip rate of the Chisato Fault, northern margin of Eastern margin Fault Zone of Nunobiki Mountains, 0.05 to 0.21 m/kyr (Mizutani, 2017).

Reference

Ishimura, D. (2013) Processes of Terrace Formation and Crustal Movement during the Late Quaternary on the West Coast of Ise Bay. *Journal of Geography (Chigaku Zasshi)*, 122, 448-471.

- Mizutani, K. (2017) Activity of the Chisato fault, eastern margin fault of the Nunobiki mountains central Mie Prefecture. Annual Meeting of the Association of Japanese Geographers, Autumn 2017, P011.
- Yoshida, F. (1984) Geology of Yokkaichi District. Quadrangle Series, scale 1: 50,000, Geological Survey of Japan. 81p.
- Yoshida, F. (1987) Geology of the Tsu-Tobu district. With Geological Sheet Map at 1: 50,000, Geological Survey of Japan, 72p.

Keywords: MIS5e, diatom fossil assemblage, pollen fossil, Yoro-Yokkaichi Fault Zone, Eastern margin Fault Zone of Nunobiki Mountains, subsurface geology