

Soil properties and Classification of Alluvium of the Tokyo lowlands

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1 Introduction

Urban developing of Tokyo, it is an important subject for foundation engineering to measure with a soft layer which widely distributes under the Tokyo lowlands. For this reason, investigation research of a soft layer (alluvium) was started at the foundation-engineering field. It has been compiled as a ground condition map by the study association or government and municipal offices. Geological research of alluvium has been advanced by Suzuki, Kaizuka and Matsuda, Aoki, etc. Kaizuka and Matsuda classified alluvium into three parts, upper, middle and lower part. Aoki classified and defined it into two formations; the upper part, Yurakucho formation, is Holocene deposit and lower part, Nanagouchi formation, is Pleistocene deposit. Endo etc. supported this alluvium two classification idea based on C14 dating data and microfossil analysis in Misato city.

We are investigating the relation between depositional environments and its soil properties of the alluvium in a metropolitan area. We get the knowledge about the classification of alluvium in which differ from the former classification of alluvium. We discuss this new Alluvium classification based on the drilling investigation data at Koto-ku in Tokyo.

2. Result of the investigation

Geological drilling was carried out at Edagawa and Oshima at Koto-ku which are located on the under buried valley and the core sample were examined by micro fossil analysis and C14 dating measurements.

1) Drilling at Oshima

The strata to the digging depth of 80m were classified eight units by considering of facieses and N value. U1 is a landfill layer. U2-U3 correspond to Yurakucho formation and U4-U7 correspond to Nanagouchi formation (U7 is basal gravel layer: BG), and U8 corresponds to the Tokyo group. From diatom analysis, Nanagouchi F. were deposited at environments of swamp and Yurakucho formation were deposited at inner bay environments.

C14 Dating data from this Yurakucho F. show 6,000-10,00y.B.P and the dating data from Nanagouchi F. show 9,000 - 11,000 y.B.P.

2) Drilling at Edagawa

The strata to the depth of 80m were classified nine units. KU1 is a landfill layer. KU 2-4 correspond to Yurakucho formation. KU 5-8 correspond to Nanagouchi F. and. KU-9 corresponds to Kazusa Group. From diatom analysis, Nanagouchi F. were deposited at environments of swamp and Yurakucho formation were deposited at inner bay environments.

C14 Dating data from this Yurakucho F. show 2500-9000y.BP and the dating data from Nanagouchi F. show BP11,000-15,000y.BP year (upper part 10,000- 11,000y.BP, lower part 10,000-15,000y.BP.)

Not only the difference by the dynamics characteristic but the physical characteristic between YurakuchoF.and Nanagouchi F. is remarkable. The depth distribution of natural water contents and liquid limits of Yurakucho F. shows the arch pattern distribution and the maximum (peak) of them is situated near a center. At Oshima, the depth of the maximum is 24m G.L. and at Edagawa, it is 19m G.L.

3. Consideration

The following things can be pointed out based on the above the data of these investigations. Nanagouchi F. (Upper part of Nanagouchi F. at Edagawa) and Yurakucho F. can be seen as a series of sediments, and the C14 data from the Nanagouchi F. show 10,000-11,000y.B.P. This means that these formations are the sediment after the younger Dryas.

1) The difference of the soil properties is considered reflecting the difference in depositional environments.

2) There were rapid and slow deposition period in Yurakucho F. and Nanagouchi Formation.

3) The depth of the peak of the depth distribution of a natural water content and liquid limit has 5m difference, but the time of the peak of the depth distribution is the same, about 4000y.B.P.

4) The age of the lower part of Nanagouchi F. at Edagawa shows 14,000y.BP. There is the time gap in about 2000 years between the upper part and the lower part of Nanagouchi Formation.