Landform evolution and active tectonics in the eastern part of Oiso Hills inferred by characteristics of gravels composing Kissawa Formation, Japan

*Masahiro Muraki[1], Toshihiko Sugai[1]

1. Graduate School of Frontier Science, The University of Tokyo

Introduction

Oiso Hills are uplift blocks bounded by active faults and uplifted rapidly in the late Quaternary period (Fig. 1: Active Fault Research Group, 1991). In the eastern part of Oiso Hills, however, the relationships between the landform development and active tectonics have not been clarified. The aim of this study is to clarify the landform evolution and the active tectonics in the eastern part of Oiso Hills based on the paleo-geography inferred from the depositional environments of gravel layers of the Pleistocene Kissawa Formation (KF: Machida and Moriyama, 1968), marine deposits of the last interglacial period (125 ka). The study area is divided into Mt. Koma area and Hinataoka area. Furthermore, Mt. Koma area can be subdivided into four blocks of OSA, OSB, OSC and OSD bounded with the active faults defined by Active Fault Research Group (1991) (Fig. 2).

Methods

In order to compare the present fluvial and beach gravels with gravels of KF, we established a frame of 1 m ×1 m at each gravel sampling site along the Kaname River, the Sagami bay beach, and at the outcrop of gravel layers of KF to collect 100 gravels from the largest size. The size, lithology, roundness and degree of weathering of the gravels were measured. Also, the matrix was analyzed with a sieve. And besides, chemical composition of tephras intervening or covering KF was analyzed.
Terrace surfaces were identified by aerial photo interpretation and field observation.

Results

The average middle diameter of the Kaname River gravels decreased downstream from 7 to 3 cm, and the average roundness increased from 0.3 to 0.6. Average flatness was 0.3 ~ 0.4. As the lithologic composition of sampled gravels, pyroclastic rocks occupied the majority upstream, and the ratio of sandstone, mudstone, and conglomerate increased to downstream. The average middle diameter of the Sagami Bay beach gravels was about 3 cm, roundness was about 0.7 and flatness was about 0.6. As the lithologic composition of sampled gravels, pyroclastic rocks, sandstone and mudstone occupied the majority. The average middle diameter of the sampled gravels of KF was about 2 cm, roundness was 0.6 ~ 0.7 and flatness was 0.3 ~ 0.4. As the lithologic composition of the gravels, pyroclastic rocks, sandstone and chart occupied the majority.
Kissawa Terrace (KT) I, II and Nanakuni-touge Terrace (230 ~ 250 ka) were identified in the study area. KT I (Shonan daira surface) develop in OSB and KT II in OSA, OSC and OSD. Eastern Takatori Terrace (ETT) formed around 30 ka by tributaries was also identified along the Fudou River.

Discussion

The flatness of the Kaname River bed gravel did not increase to downstream, while the roundness increased associated with the decrease of the particle size. Lithologic composition of the lowest reach of the Kaname River bed gravels was similar with that of the Sagami River, suggesting that the Sagami River flowed to the west side of the Sagami plain in the late Holocene, depositing gravel of the Sagami River

system at around the lowest reach of the present Kaname River. Sagami Bay beach gravels were characterized by well-rounded flat shape influenced by coastal current. Kaname River gravels and Sagami Bay beach gravels were distinguished from roundness 0.6, lower was the former and higher was the latter. Spatial variation of characteristics of the KF gravels implies that KT I is older than the last interglacial period and OSB may be a hilly island during the last interglacial period while the Kaname River flowed into the present Fudou River and formed KT II. This interpretation suggests that the Hinataoka and Komukai fault activities triggered the change of the river course in the last glacial period. After that ETT was probably formed by tributaries flowed into the present Fudou River.

Reference
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