

Facies stacking patterns and ground motion characteristics of incised-valley fills beneath uplands in the Tokyo metropolitan area

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Uplands in the Tokyo metropolitan area are in places underlain by soft incised-valley fills, called the lower part of the Kioroshi Formation. They are composed mainly of inner-bay muddy sediments with a basal fluvial gravel bed, which are very similar to those of valley-filling post-LGM deposits beneath lowlands. Stratigraphic examination reveals that the incised-valley fills beneath uplands deposited during the Last Interglacial of MIS 5e (~12.5 ka) after the valley formation during the preceding glacial period of MIS 6 (~14 ka).

The valley-filling muddy sediments beneath uplands are soft with SPT N-values between 1 and 5, and S-wave velocities of ~150 m/s. Microtremor observations show that ground motion characteristics reflect the distribution of these incised-valley fills. A peak at around 1Hz appears in the microtremor horizontal to vertical (H/V) spectral ratio at locations where the valley-filling muddy bed is relatively thick (~20 m) and overlain by marine muddy sediments (the upper part of the Kioroshi Formation) and volcanic ash soil (the Kanto Loam Bed). Peak patterns in the H/V spectral ratio depend on facies stacking patterns of the incised-valley fills and overlying strata.

When considering either geotechnical problems or geological disasters associated with amplification of earthquake motions in the Tokyo metropolitan area, we need to focus on the soft muddy valley-fills beneath uplands.

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