

## MIS 5c key-maker tephras in the upper Pleistocene Joso Formation in the southern Sashima, Tsukuba and northwestern Shimosa Uplands, Kanto plain, Japan

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Most of the terraces in the Kanto Plain had been formed in marine oxygen isotope stage (MIS) 5 under the influence of eustatic sea-level lowering after MIS 5e and Kanto basin forming movement characterized by uplift of the marginal part and subsidence of the central part. It remains unknown how upper Pleistocene Joso Formation, Shimosa Group and terraces composed of the Joso Formation had been evolved after MIS 5e at the central Kanto Plain. This study classified terrace surfaces by the integration of geomorphic analysis, sedimentary facies analysis and tephra analysis focusing on the southern Sashima, Tsukuba and northwestern Shimosa Uplands in the central part of the Kanto Plain. Terrace surfaces were classified into 6 levels. The terrace sediments distributed over the 1 to 5 levels from the top in the Sashima Upland and 1 to 3 levels from the top in the Tsukuba Upland were divided into two formations; Kioroshi Formation composed of beach facies, and the Joso Formation composed of flood plain and channel facies. In the Joso Formation, we found two different tephras and correlated them to Nk-Ma (c. 100 ka: Yamamoto, 2012) at Tsukuba Upland and On-Pm1 (c. 96 ka: Aoki et al., 2008) at Sashima upland by element analysis of the volcanic glass and minerals.

Nk-Ma has been identified in the Naka, Kashima, Namekata, Nihari and Inashiki Uplands (Ooi, Ph. D, 2013). We identified Nk-Ma tephra in the Tsukuba upland for the first time. This indicates that the southern limit of Nk-Ma fall range becomes much wider than previous studies. Nk-Ma in the Tsukuba upland has 2 to 8 cm thickness, 12 mm maximum pumice size, light yellow color. It contains orthopyroxene, clinopyroxene, hornblende, brownish bubble-wall and grayish pumice type glass shards. It is expected to trace of Nk-Ma for other regions and to date of Joso formation with tephra including Nk-Ma.

References: Aoki *et al.* (2008) *The Quaternary Research*, **47**, 391-407. Ooi (2013, Ph. D) Doctoral thesis, Graduate school, Ibaraki University, 172p. Yamamoto (2012) *Bulletin of the Geological survey of Japan*, **63**, 35-91.

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