

Zircon U-Pb dating and Fission track age of a Pliocene Ohta Tephra in the Tokai Group

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In Japan, tephrochronology is a powerful tool for dating of sediments because the Japanese Islands have many volcanos. As a result of a development of analytical methods and increase of field data of tephra, tephrochronology has been applied for Pliocene sediments as well as Pleistocene and Holocene. The Ohta tephra in the Pliocene Tokai Group is one of representative tephra with widespread depositions in central Japan. Although age determination of the Ohta tephra is important for regional correlation of the Pliocene strata in Japan, the age had not been well-constrained by previous studies, showing a wide age range from 3.3 to 5.24 Ma by zircon fission track (FT) dating [1]. Thus, in this study, zircon U-Pb and FT double dating for single grain was newly applied for the Nakatsugawa I and II volcanic ash layers, which have been correlated to the Ohta tephra [2].

Two samples from the outcrop in the Nakatsugawa City, Gifu Prefecture were used for the dating. Weighted average U-Pb ages from measured grains except heterogeneous and discordant grains were 3.78 ± 0.10 Ma and 3.90 ± 0.11 Ma. Weighted average FT ages from the grains used for the U-Pb dating were 3.74 ± 0.24 Ma and 4.11 ± 0.27 Ma. Although the closure temperature of zircon is about 900 °C for U-Pb method [3] and about 240 °C for FT method [4], the U-Pb ages are included in the range of the error of the FT ages. This indicates that the zircons were crystallized at high temperature and then quenched, and that these ages correspond to the eruption age of the tephra. This result is consistent with the study by Satoguchi et al. (2005) [5] that estimated the 3.9 Ma as the age of the Ohta tephra based on the paleomagnetic and biostratigraphic correlations with the Miura Group. The zircon U-Pb and FT double dating for the Ohta tephra in this study will contribute to the regional correlation of Pliocene strata in central Japan.

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References: [1] Nakayama and Yoshikawa (1995), *Earth Sci (Chikyu Kagaku)*, **49**, 406-418. [2] Todo Collaborative Research Group (1985), *Assoc. Geol. collab. Jpn.*, **29**, 101-117. [3] Cherniak and Watson (2001), *Chem. Geol.*, **172**, 5-24. [4] Hurford (1986), *Contrib. Mineral. Petrol.*, **92**, 413-427. [5] Satoguchi et al. (2005), *Jour. Geol. Soc. Jpn.*, **111**, 74-86.

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