

Garnet-bearing tephra layer Na-G in the Inubou Group, Choshi area, Chiba Prefecture, central Japan

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The Plio-Pleistocene Inubou Group distributed in the Choshi district. The age of the Inubou Group is estimated to be the same of Kazusa Group in the Boso Peninsula based on microfossil biostratigraphy and magnetostratigraphy (Sakai, 1990). The key tephra layers of the Yokone and Obama Formations of the upper part of the Inubou Group are correlated with the Ch2, Ku6, U6-8, O3-7, Kd5-38 and Kd39 tephra layers in the Kazusa Group (Okada et al., 1998; Fujioka and Kameo, 2004). The Inubou Group is unconformably underlain by the Miocene sediments. The age of the lower part of the Inubou Group is very important. Tamura et al. (2006) correlated with the vitric tephra contained in the Kasuga and Naarai Formations of the lower part of the Inubou Group and other Plio-Pleistocene widespread tephra in the Okasa, Kobiwako, Niigata and Kazusa Groups. In the Kasuga Formation, there are Mitsumatsu-Kd44 tephra (1.9Ma), HSA-Kiryu1 tephra and HSC tephra. In the Naarai Formation, Na5 tephra is correlated with Taniguchi tephra (2.2-2.3Ma), Na4b tephra is correlated with Hap2 tephra (2.4Ma) and Na2 tephra is correlated with UN-MD2 (2.65Ma) tephra. Based on the tephra correlation, the sedimentary age of the lower part of Inubou Group is estimated to be 1.9-2.65Ma.

In this study, we find out garnet-bearing tephra layer Na-G tephra in the middle part of Naarai Formation. The Na-G tephra interbedded between Na4b (2.4Ma) and Na2 (2.65Ma), and is composed of fib, sp, sb type glass shard, plagioclase, quartz, garnet, hornblende and opaque minerals. The chemical composition of garnet is Alm54-56, Sps21-23, Prp15, Grs7-8.

Two tephra layers abundant in garnet are known; Inubise garnet pumiceous tephra (Igp: Uonuma Formation) and Mk19 tephra (Mk19: Nakatsu Formation). Igp is overlain Taniguchi-Tsp, but Na-G is underlain by Na5 (Taniguchi-Tsp). Igp is different from Na-G. On the other, Mk19 is correlated with garnet rhyolite in the Hoshokawa valley in the Tanzawa Mountains. The age of garnet rhyolite is 2.43 ± 0.15 Ma (K-Ar dating) and 2.32 ± 0.035 Ma. Mk19 and Na-G are almost the same age. Additionally, the mineral composition, refractive indices of volcanic glass and hornblende, and chemical composition of garnet phenocryst of Mk19 are all same as Na-G. Accordingly, Na-G is correlated with Mk19.