History of the Kikai Caldera that devastated the prehistoric Jomon culture in southern Japan as revealed by zircon U-Pb dating

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The largely submerged Kikai Caldera, situated ~50 km off the Kyushu Island, is well-known as the caldera that devastated the prehistoric Jomon culture in southern Kyushu when it erupted huge tephras (K-Ah) at ~7,300 years ago (7.3 ka). Understanding the eruptive history of the Kikai Caldera is critically important because it may affect long time safety of radioactive waste depository and so on. At least two caldera-forming eruptions before K-Ah were assumed so far: the K-Tz and Ksd. The eruption age of the K-Tz is well constrained at ~95 ka while that of the Ksd is poorly constrained at 0.58 ± 0.16 Ma (2 σ) by the glass fission-track (FT) method [1]. Here, we dated K-Tz and Ksd by the zircon U-Pb method using LA-ICP-MS for samples collected at Yakushima Island, ~25 km south of the Kikai Caldera. We also dated the Anbo tephra which was originally dated at 0.78 ± 0.18 Ma (2 σ) by the glass FT method. As a result, both Ksd and Ando were dated as 0.63 ± 0.04 Ma (95% conf.; n=19, MSWD=3.0) and 0.73 ± 0.04 Ma (95% conf.; n=40, MSWD=1.6), respectively, which are much tightly constrained ages than those by the glass FT method. Some zircons from the K-Tz showed similar ages of both Ksd and Anbo, therefore it was assumed that the Anbo tephra was also originated from the Kikai Caldera. If this is the case, the initial caldera-forming eruption occurred at ~0.73 Ma followed by ~0.63 Ma, ~0.1 Ma and the latest ~0.01 Ma (or 7.3 ka). If this periodicity persists, the volcanic activity at the Kikai caldera may be subdued for another 0.5 million years.

[1] Moriwaki et al. (2008) *Quaternary International* **178**, 128–137.