

Zircon U-Pb age and stratigraphy of some Quaternary tephras around Kagoshima Bay

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It is important to investigate eruption ages of Quaternary widespread tephras originated from in and around Kagoshima Bay, because some of these tephras are assumed to have reached as far as Boso Peninsula (~1,000 km away from the source), and therefore they are essential to establish tephrostratigraphy in Japan and also to evaluate future mega disaster caused by super eruptions. Here we examined and obtained zircon U-Pb ages on some tephras at well-exposed outcrops near Yamada River, one of tributaries of Beppu River, that runs into Kagoshima Bay. We also measured zircon U-Pb ages on some other tephras of regional importance in order to correlate these tephras. The U-Pb data were obtained from 2017 to 2019, and were calculated based on Sakata (2018), which tends to yield relatively older ages for tephras <0.5 Ma, compared to Ito (2014).

We observed Komiyaji pyroclastic flow deposits (pfl) and Oda pfls I and II, in ascending order at the outcrops near Yamada River (Yamada Outcrop). Based on the fact that these tephras are covered by the ~0.34 Ma Kakuto pfl and some biostratigraphic evidence, their eruption ages were assumed to be middle Pleistocene (Kagawa and Otsuka, 2000). We obtained zircon U-Pb ages of 0.67 ± 0.34 Ma (n=5, MSWD=2.8) for Komiyaji pfl and 0.71 ± 0.12 Ma (n=5, MSWD=0.86), 0.61 ± 0.11 Ma (n=8, MSWD=3.2) and 0.40 ± 0.17 Ma (n=6, MSWD=3.6) at three localities of Oda pfls I and II. We also obtained ages of 0.57 ± 0.09 Ma (n=9, MSWD=1.3) for Nabekura pfl and 0.48 ± 0.14 Ma (n=8, MSWD=2.9) for Hegawa pfl, both of which crop out near the Yamada Outcrop. A zircon U-Pb age of 0.65 ± 0.12 Ma (n=12, MSWD=2.1) was also obtained from Kakuto pfl that cover all the tephras mentioned above.

Therefore, our results indicate that the three lower-most tephras (Komiyaji, Nabekura and Hegawa pfls) were erupted at 0.5–0.6 Ma, which is consistent with the stratigraphy. The 0.4–0.7 Ma Oda pfls I and II and the 0.65 Ma Kakuto pfl ages are older than the stratigraphy, which may indicate that these are not eruption ages but the time when magma crystallized zircons or the tephras may have incorporated older zircons prior to final deposition. We plan to investigate zircon morphology and composition to further examine magmatic conditions that erupted these tephras.

References: Ito, 2014, *J. Volcanol. Geotherm. Res.*, 289, 210–223; Kagawa and Otsuka, 2000, *J. Geol. Soc. Japan*, 106, 762–782; Sakata, 2018, *Geochem. J.* 52, 281–286.

Keywords: Quaternary, tephra, zircon, U-Pb dating, Kagoshima