

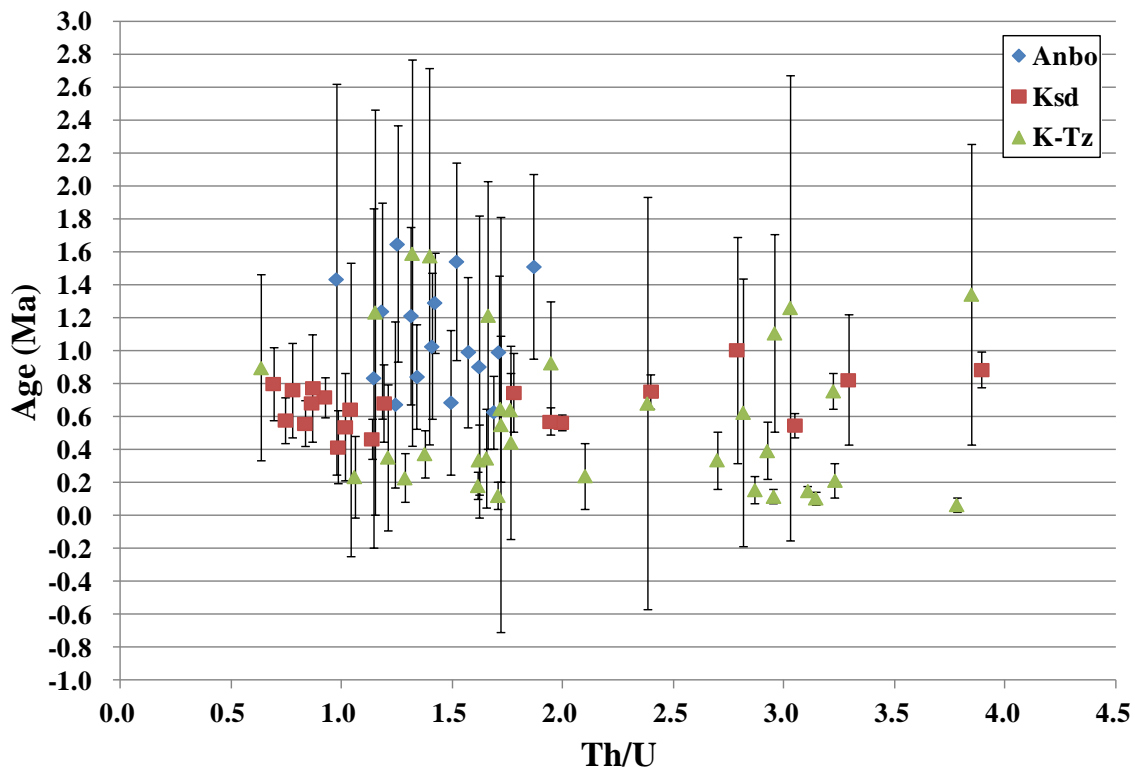
# Paper Number: 156

## Unravelling caldera-forming gigantic eruptions by Quaternary zircon U-Pb dating

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Zircon U-Pb dating is now widely used to unravel Earth's history. It can accommodate a timeline from Hadean to Quaternary. Dating Quaternary tephras is invaluable because it includes dating on the historic timescale. Here LA-ICP-MS U-Pb dating was performed on Quaternary zircons from tephras produced during caldera-forming gigantic eruptions in Japan. First, the Toya Tephra, which created a ~13-km-wide caldera at ~0.1 Ma in northern Japan, was dated [1]. The obtained U-Pb ages were tightly clustered at ~0.1 Ma, suggesting that the caldera-forming eruption occurred only once at ~0.1 Ma. On the contrary, dating the Kikai-Tozurahara Tephra (K-Tz), which was sampled at Yakushima Island, southern Japan, tells a different story. The K-Tz, which is assumed to have erupted at ~0.1 Ma from the Kikai Caldera, contained many older (mostly ~1.0 Ma and 0.6 Ma) zircons in addition to ~0.1 Ma zircons (Figure 1). The ~1.0 Ma and 0.6 Ma zircons were assumed to be identical to two other tephras (Anbo and Ksd) distributed on Yakushima Island, ~25 km south of the Kikai Caldera. If this is the case, it is plausible that the K-Tz and the other two tephras were all derived from the Kikai Caldera and the caldera should have experienced at least three (~1.0 Ma, 0.6 Ma, and 0.1 Ma) gigantic eruptions. This implication is important in that tephras of unknown source can be identified by the zircon U-Pb method. In conclusion, zircon U-Pb dating on Quaternary tephras will contribute to the understanding of gigantic volcanic eruptions reaching into the historic time scale. Thus, this research is directly relevant to human society.



*Figure 1: Zircon Th/U vs. U-Pb age diagram for the three tephras in Yakushima Island*

*Reference:*

[1] Ito H (2014) J Volcanol Geotherm Res 289: 210-223

