



Evidence of prolonged felsic magmatism within the Karoo large igneous province

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The Karoo large igneous province (LIP) extends from southern Africa to East Antarctica, and marks the onset of rifting of these two continents. The main stage of volcanic activity occurred ~ 182180 Ma ago, and was mostly mafic in composition. We report new thermal ionization (TIMS) and secondary ion (SIMS) mass spectrometric U-Pb ages on zircon from felsic lavas in Lebombo monocline, southern Mozambique and from granitoid intrusions in Vestfjella, Dronning Maud Land, Antarctica.

Utpostane granite in southern Vestfjella yields a TIMS age of 180.7 ± 1.5 Ma, complying with the main stage of magmatism in the Karoo LIP. Three rhyolitic beds intercalating mafic volcanic layers of the Lebombo monocline give SIMS ages of 182 ± 3 Ma, 178 ± 3 Ma, and 172 ± 2 Ma, respectively. The zircon in the oldest of these can be divided in two groups: (a) internally homogeneous, low U and Pb zircon and (b) oscillatorily zoned, relatively high U and Pb zircon. The ages of these groups are ~ 179 Ma and ~ 184 Ma, respectively, but they overlap within error limits, and thus a combined age for this sample is preferred. Finally, an alkali feldspar granite xenolith from a lamproite dike in Vestfjella has a SIMS age of 165 ± 1 Ma.

Lu-Hf isotopes were analyzed from zircons in the 172 Ma rhyolite sample. They show fairly homogeneous Hf isotope composition, with initial ε_{Hf} values between +4 and +10. The corresponding crustal residence ages for the zircons vary between ~ 300 and ~ 500 Ma, implying source recycling. In light of the new data it is thus evident that, while most of the Karoo LIP may have emplaced within a short time frame, igneous activity continued for at least ~ 15 Ma.