Nd and Sr Isotopic Mapping of the Archaean-Proterozoic Boundary in Southeastern Tanzania Using Granites as Probes for Crustal Growth

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Abstract
Granitoids of two different generations occur across the Archaean-Proterozoic boundary in southeastern Tanzania. The first generation, which is confined to the Archaean Tanzania Craton, yields Rb□Sr whole-rock isochron ages of 2600 Ma and low, mantle-like, initial 87Sr/86Sr ratios (0.702–0.704). These coupled with positive or near-zero ϵNd values (−0.2 to 2.0) suggest that these granitoids represent juvenile mantle material which was added to the continental crust at about 2600 Ma. The second generation of granitoids intrudes the Palaeoproterozoic Usagaran Belt and is characterised by Rb□Sr whole-rock isochron ages of about 1900 Ma. These granitoids show Sm□Nd crustal formation ages which are 200 to 600 Ma older than their emplacement ages and negative ϵNd values (−2.2 to −6.2). Mixing calculations suggest that the Proterozoic granitoids may have formed by partial melting of 2000 Ma (Usagaran) mantle-derived material which had incorporated between 15 and 45% of an Archaean component from the adjacent Tanzania Craton.