Sm□Nd garnet ages from the Uluguru granulite complex of Eastern Tanzania: further evidence for post-metamorphic slow cooling in the Mozambique belt

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Abstract

Two samples from the Uluguru granulite complex yield garnet Sm□Nd ages of 633 ± 7 and 618 ± 16 Ma, similar to previously published hornblende 40Ar□39Ar and K□Ar ages. The similarity of the Sm□Nd to the K□Ar age suggests that the closure temperature of garnet to Nd diffusion is similar to that of hornblende to Ar diffusion. Assuming that published zircon U□Pb ages of about 700 Ma date peak granulite-facies metamorphism, a mean post-metamorphic cooling rate of 2–3°C/Ma can be calculated for the time interval 700 to 630 Ma. Such slow cooling rates imply thermal relaxation with a thickness length-scale greater than the thickness of average continental crust. This, in turn, implies that the thermal perturbation responsible for metamorphism was preceded by regional crustal thickening probably in a collisional orogen.