

AGE AND MAGMATIC HISTORY OF THE ANTANANARIVO BLOCK, CENTRAL MADAGASCAR, AS DERIVED FROM ZIRCON GEOCHRONOLOGY AND Nd ISOTOPIC SYSTEMATICS

¹KRÖNER, A., ²HEGNER, E., ³COLLINS, A. S., ³BREWER, T. S., ³WINDLEY, B. F. and ⁴RAZAKAMANANA, T. ¹Institut für Geowissenschaften, Univ. Mainz, 55099 Mainz, Germany; ²Institut für Geochemie, Univ. Tübingen, Wilhelmstraße 56, 72074 Tübingen, Germany; ³Orogenic Processes Group, Department of Geology, Univ. Leicester, Leicester LE 1 7RH, UK; ⁴Département des Sciences Naturelles, Univ. Toliara, Toliara, Madagascar.

We report single zircon ages, combined with whole-rock Nd isotopic systematics, for granitoid rocks from the Antananarivo Block (terrane), one of five tectono-metamorphic units making up the Precambrian basement of central and northern Madagascar. Our data reveal three distinct age groups at ~530-560Ma, 740-820Ma and 2500-2520Ma respectively that reflect major magmatic events and correlate with similar events in various parts of East Africa and Sri Lanka but not in southwestern India. A widespread high-grade metamorphic event at ~550Ma transformed many of the earlier granitoid gneisses into enderbite-charnockite assemblages. This granulite-facies event is common to Madagascar, East Africa and southernmost India/Sri Lanka and reflects the final amalgamation of East and West Gondwana. Contrary to previous interpretations, there is a distinct lack of Kibaran-Grenvillian magmatism or metamorphism in Madagascar, making it unlikely that the island played a major role in the accretionary history and amalgamation of the supercontinent Rodinia. The widespread and voluminous granitoid magmatism at ~740-820Ma remains enigmatic, and the tectonic scenario with which it is associated is difficult to reconstruct due to severe tectonic transposition of most gneisses. Although a subduction component is suggested from the whole-rock geochemistry of the dated samples, the Nd isotopic systematics as well as abundant zircon xenocrysts attest to extensive remelting of Proterozoic and Archaean crust with only minor involvement of juvenile material. The ~740-820Ma granitoids are possibly related to consumption of the Mozambique ocean during break-up and dispersal of Rodinia. They were emplaced into the Archaean crust of central Madagascar as it lay either attached to East Africa, or formed a microcontinent within the Mozambique ocean.