

MESOPROTEROZOIC EVOLUTION OF THE NAMPULA BLOCK, N. MOZAMBIQUE

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The Nampula Block is the largest Mesoproterozoic crustal domain in northern Mozambique, covering >100,000 km² and constituting one of the most important components of the southern part of the Neoproterozoic to Cambrian (“Pan-African”) East African Orogen. The Nampula Block is bounded in the north by the WSW–ENE-trending Lúrio Belt and by younger rocks to the south and east. The oldest rocks of the Nampula Block, the Mocuba Suite, are a polydeformed sequence of upper amphibolite-grade layered grey gneisses and migmatites associated with intrusive trondhjemite-tonalite-granodiorite and granitic orthogneisses. A Mocuba Suite sample of banded quartz-feldspar-hornblende-biotite gneiss with dacitic composition, interpreted as a meta-volcanic rock, yielded a U-Pb SIMS zircon date of 1127 ± 9 Ma. Metamorphic rims, dated at ca. 1090 Ma, support the existence of metamorphism coeval with a later magmatic phase, represented by the intrusion of the tonalitic Rapale Gneiss, two samples of which were dated at 1095 ± 19 and 1091 ± 14 Ma, respectively. The earliest (D₁) deformation that took place at approximately this time was associated with high grade metamorphism and migmatization of the Mocuba Suite. The geochemistry of these rocks suggests that they were generated in a juvenile, island-arc setting. The Mocuba Suite is interlayered with extensive belts of meta-pelitic, psammitic, calc-silicate and felsic to mafic (meta-volcanic?) paragneisses termed the Molócuè Group. U-Pb data from detrital zircons from a siliceous calc-silicate paragneiss gave a bimodal age distribution with peaks at ca. 1100 and 1800 Ma, showing derivation from rocks of the same age as the Mocuba Suite and a Palaeoproterozoic source region. The age of the Molócuè Group has been directly determined by zircon dates of 1092 ± 13 and 1090 ± 22 Ma, obtained from two samples of the leucocratic Mamala Gneiss, interpreted as meta-felsic volcanics, one of its major constituent components.

The final phase of Mesoproterozoic activity is represented by voluminous plutons and sheet-like bodies of foliated megacrystic granite, augen gneiss and granitic orthogneiss of the Culicui Suite. These rocks have A-type granite geochemical characteristics and are interpreted to have been generated in a late tectonic, extensional setting. Zircons from three samples from the suite gave identical ages of ca. 1075 Ma.

The Nampula Block was extensively reworked during the major (D₂₋₃: Pan-African) collision orogeny and its aftermath in Late Neoproterozoic to Cambrian times, when virtually all the major regional fabrics were imposed upon the Mesoproterozoic rocks under amphibolite-facies metamorphic conditions. In the dated Mesoproterozoic samples, this orogenic event is represented by metamorphic zircon rim ages of ca. 550 to 500 Ma. The new data indicate that the Mesoproterozoic rocks of the Nampula Block were originally accreted to a crustal block with a Palaeoproterozoic signature, the Kalahari Craton. The geological history of the Nampula Block is comparable with that described from other parts of the Mesoproterozoic orogenic belts of the Kalahari craton and helps to constrain an integrated model of the evolution of these areas.