GEOLOGICAL EVOLUTION OF NORTHEASTERN MOZAMBIQUE, IN THE CONTEXT OF THE PAN-AFRICAN GONDWANA ASSEMBLY

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Results of an integrated geological mapping, geochronological, geochemical and airborne geophysics programme in NE Mozambique bring improved constraints on the sequence of events leading to the assembly of Gondwana along the East African Orogen (see Reference List). From the NW (foreland) to the SE (hinterland), a crustal transect across NE Mozambique shows division into 4 major lithotectonic units. (1) The Palaeoproterozoic Ponta Messuli Complex is part of the Congo–Tanzania foreland. It preserves a 1950 ±15 Ma granulite facies metamorphism typical for the Usagaran belt, was intruded by 1056 ±11 Ma granites, and is overlain by the Neoproterozoic Txitonga Group containing an interlayered rhyolite dated at 714 ±17 Ma. (2) The Mesoproterozoic Unango and Marrupa Complexes are probably indigenous to the Congo–Tanzania margin and correlate with the southern Irumide belt. These units consist mainly of felsic orthogneiss that are generally alkali-calcic to shoshonitic and dated between 1062 ±13 to 946 ±13 Ma. They underwent up to granulite-facies metamorphism between 962 ±18 to 945 ±33 Ma. Pan-African high-grade metamorphism at 569 ±16 to 536 ±6 Ma is increasingly pervasive southwards, towards the Lurio Belt. (3) The Cabo Delgado Nappe Complex (CDNC) consists of Neoproterozoic magmatic suites and paragneisses, including marbles. It is characterized by a granulite facies event at 735 ±4 Ma (Xixano Complex) and high-grade metamorphism at 631 ±6 to 607 ±11 Ma. The CDNC is interpreted as remnants of an early Pan-African (640–600 Ma) accretionary collage, involving lithologies indigenous to the Congo–Tanzania margin (973 ±11 to 946 ±12 Ma felsic orthogneiss) and outboard volcanic arcs formed in the Mozambique Ocean. These include metarhyolites (818 ±10 Ma), enderbites (744 ±11 to 735 ±4 Ma), granites (742 ±8 Ma) and granodiorites (696 ±13 Ma) in the Xixano and Lalamo Complexes. The bulk of volcanic-arc rocks display a low-K calcic geochemistry consistent with a prominent radioelement- poor signature (low K-U-Th) on ternary radioelement maps. The CDNC was transported northwestwards onto the Unango and Marrupa Complexes after 596 ±11 Ma, the age of the youngest dated pluton in the nappes. It can be correlated with the Western Granulite Nappes in Tanzania and the Vohibory Complex in Madagascar. (4) The Nampula Complex consists mainly of 1148 ±1 to 1028 ±7 Ma felsic orthogneiss interlayered with paragneiss. It shows evidence for a Mesoproterozoic high-grade metamorphism at around 1090 Ma, though all structures are interpreted as Pan-African. It is characterized by 543 ±23 to 493 ±8 Ma late Pan- African metamorphism overlapping in age with migmatitization and abundant 511–508 Ma felsic plutonism. It is overthrust by the granulite-bearing Mugeba and Monapo klippen, which may be related to the CDNC. The Nampula Complex has an affinity with the Dronning Maud Land belt in East Antarctica. North of the Nampula Complex, the Lurio Belt is an ENE-trending, NNW-dipping, 500 km long linear structure, cored by granulites, which becomes more complex westwards, forming multiple, splayed weaker structures. It reworks the previously established nappe stack (units 2–3). It records final Pan- African shortening, as evident from granulite-facies metamorphism between 576 ±6 and 539 ±15 Ma (up to 1.55 GPa) and extreme flattening of 949 ±13 to 612 ±6 Ma lithologies. It is characterized by widespread 538 ±10 to 504 ±11 Ma syn- to post-kinematic felsic plutonism. The status of the Lurio Belt as a Pan-African suture zone between the Zimbabwe and Congo–Tanzania cratons is discussed.

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