



Pan-African tectonic evolution and reactivation in northern Mozambique

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A combination of new field structural observations, geochronology and high-resolution potential field geophysical data, has led to a novel tectonic Pan-African framework for the crustal architecture in northern Mozambique. Five major, genetically distinct mega-units were imbricated and deformed during the NW-verging Pan-African orogeny (subsequently reworked post thrust-stacking) are distinguished. (1) At the base of the tectonostratigraphy, a Palaeo-proterozoic domain belonging to the foreland of the Pan-African orogen corresponds to the Ponta Messuli Complex; (2) A Mesoproterozoic gneiss domain made up of felsic crust reworked and transported during the Pan-African orogeny corresponds to the Nampula, Unango, Marupa, Nairoto and Meluco Complexes; (3) A dominantly Neoproterozoic domain forming a far-transported Pan-African upper nappe system, exposed in the Xixano, Lalamo, M'Sawize, and Muaquia Complexes, the Monapo and Mugeba klippen, and possibly the Txitonga Group; (4) Local Neoproterozoic cover sequences; these are the Mecuburi and Alto Benfica Groups overlying the Nampula Complex and the Geci Group overlying the Unango Complex; (5) The Montepuez and Ocuá Complexes, interpreted as a Pan-African tectonic melange including lithologies from mega-units 2 and 3, and forming the core of the Lurio belt. The Lurio belt represents a major Pan-African structure reworking mega-units 2 and 3. We envisage the following possible chronological sequence of events and structures involving these mega-units: **a)** Early granulite-facies metamorphism at 735 ± 4 Ma locally preserved within mega-unit 3 **b)** In the western Lurio belt, an early D1 deformation event that can be tentatively linked to the development of later Pan-African granulites (the youngest of which is reported in the Mugeba Klippe with an age of ca. 614 ± 8 Ma. **c)** A major, post-615 Ma top-to-NW directed nappe-stacking episode juxtaposed the tectonic imbricates of the Ponta

Messuli, Txitonga, Unango, Marrupa and Xixano Complexes. **d)** A regional, crustal-scale set of E/ENE-W/WSW trending upright, open to tight folds stretching from the Lurio belt in the south to the Tanzanian border in the north. Fold axes plunge moderately to the W/WSW. Geochronology constrains the age of this event to between 580 and 530 Ma, coincident with the age of the granulites of the Lurio belt. **e)** Top-to-NW extensional structures, representing a phase of crustal extension co-axial with the earlier compressional event, are recorded in 530 Ma monazite ages from newly-formed extensional mylonitic fabrics. **f)** Widespread Pan-African intrusions follow specific structural trends of the regional crustal architecture and were probably facilitated by the crustal thinning starting at 530 Ma. In conclusion, the present-day structural architecture of northern Mozambique in general and the Lurio belt in particular, records a long-lived deformation history with phases of alternating compression and extension along a roughly coaxial NW-SE trend.