



Geology of the Monapo Klippe, NE Mozambique and its significance for assembly of central Gondwana

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ABSTRACT

The Monapo Klippe in north-east Mozambique is an ovoid-shaped outcrop measuring approximately 35 × 40 km and is clearly visible on satellite and geophysical images. Based on recent field mapping, geochemical studies and new geochronological data, we present a revision of the lithostratigraphy of the klippe and offer a model for its origin and emplacement in the framework of regional tectonics. There are three main groups of rocks within the klippe: (1) the Metachéria Metamorphic Complex; (2) the Mazerapane Intrusive Suite; and (3) the Ramiane Intrusive Suite. The Metachéria Metamorphic Complex consists of a mélange of granulite gneiss, including mafic, felsic, pelitic and carbonate rocks, characterised by a strong penetrative shear fabric. The largely undeformed Mazerapane and Ramiane Suites have intruded into the Metachéria Metamorphic Complex. The Mazerapane Suite consists of foid-bearing ultramafic and mafic gneisses and intrudes into the western half of the complex, whereas the Ramiane Suite is dominated by alkaline granitic rocks, contains no foid-bearing units and intrudes into the eastern half of the complex. In addition to these three main units, there are a number of minor but structurally important units, the main ones of which include amphibolite-facies tonalitic gneisses and the Evate calcite carbonatite. Underlying all of these units is a narrow, high strain mylonite zone. Undeformed pegmatite bodies and dykes cross-cut all rock types of the Monapo Klippe including the marginal mylonite. Near identical dates for the intrusion of the Ramiane Suite at 637 ± 5 Ma and metamorphism of the Metachéria Complex at 634 ± 8 Ma indicates a major episode of granulite-facies metamorphism and crust generation at this time. The ~635 Ma age for the granulite-facies metamorphism is comparable to granulite-facies events identified in other parts of the East African Orogen in Tanzania, Madagascar and other parts of northern Mozambique to the north of the Lúrio Belt. The absence of granulite-facies rocks in the underlying Nampula Block is consistent with structural arguments that the Monapo Klippe is the remnant of an allochthonous thrust sheet. In this context, the Monapo Complex is very similar to other granulite-facies “klippe” in East Africa, Antarctica and Sri Lanka, lending support to the idea of a Pan-African mega-nappe formerly existing across greater East Gondwanaland.

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1. Introduction

The diverse terranes amalgamated during the Meso to Neoproterozoic to form present day northern Mozambique preserve

a record of the kinematics of Gondwana construction as well as an opportunity to observe deeper crustal levels of a large orogenic belt. The crust in northern Mozambique is cut into two similar but different tectonic blocks by the ENE-trending, NW-dipping Lúrio Belt. This belt is made up of highly strained Neoproterozoic mafic granulites of the Ocua Complex and is thought to mark a major crustal boundary (Fig. 1; Viola et al., 2008; Bingen et al., 2009; Macey et al., 2010). To the south of the Lúrio Belt, the Nampula Block (the Nampula Complex of Jacobs et al., 2008) forms a large contiguous crustal block which consists of 1150–1070 Ma orthogneisses and

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