



## Preliminary Geochronology of the Mecubúri and Alto Benfica Groups, Newly-discovered Neoproterozoic metasedimentary Rocks Overlying the Mesoproterozoic Nampula Complex, NE Mozambique

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A World Bank funded regional geological mapping project has been completed in NE Mozambique by a NGU-BGS consortium. The Nampula Complex comprises the southernmost and most extensive part, of a collage of Mesoproterozoic (~1.1 to 1.0 Ga) high grade granitoid-gneiss crustal blocks which make up the greater part of NE Mozambique. The Mesoproterozoic rocks are structurally overlain by two isolated sequences of sillimanite-grade cover rocks termed the Mecubúri and Alto Benfica Groups which are believed to have been deposited unconformably on the Nampula Complex.

The Alto Benfica Group is a stratified quartzitic package that occurs as a series of narrow, isolated lens-shaped outcrops in the region around Alto Benfica. The main lithology is made up of matrix-supported sillimanite-bearing metaconglomerates, which contain biotite granite, and leucogranite gneiss pebbles with fresh, pink K-feldspar, ranging in size from a few centimetres up to 15 cm. The conglomerates are interbedded with discontinuous layers (<2cm thick) of quartzite, within which minor asymmetrical folds are seen. In these, feldspathic quartzitic and micaceous layers tend to alternate with layers rich in sillimanite and there is a strong foliation defined by strained, elongate quartz grains and oriented micas and fibrolitic sillimanite aggregates. The sequence is typically not migmatitic.

Some 350 km to the NE, the Mecubúri Group occupies an area of about 500 km<sup>2</sup> near Mecubúri town. The contacts with the surrounding gneisses of the Nampula Complex are nowhere exposed, but there is circumstantial evidence to suggest that the contact is unconformable, rather than tectonic with the absence of shearing and an observed overstepping relationship to different units of the underlying Nampula Complex. In addition, basal conglomeratic units are present containing boulder-sized clasts that may be correlated with lithologies in the adjacent, underlying Nampula Complex. The Mecubúri Group has been subdivided into a number of units including matrix-supported gneissic metaconglomerates and meta-arkosic gritstone, calc-silicate gneisses and biotite gneiss with sillimanite-nodule pseudoconglomerates.

Zircons have been separated from two quartzite-conglomerate samples from each of the groups in order to constrain the ages of their provenance rocks and their maximum depositional age. The zircons were analysed by ICP-MS at the NIGL-BGS facility in Keyworth, UK. SHRIMP data are available from one of the Alto Benfica Group samples. The age populations of the two Groups are distinctly different. The Alto Benfica Group zircons record a multi-age detrital provenance, ranging from Archaean to Palaeo-, Meso and early Neoproterozoic, with metamorphic rims dating Palaeozoic high-grade metamorphism at ~490 Ma. The maximum age of sedimentation of the Alto Benfica Group



is constrained to about 900 Ma. Both Mecubúri Group samples contain a detrital zircon population that yields a single, tight, Mesoproterozoic age cluster of ~1000 to 1050 Ma, with no older grains. This suggests a single local provenance from the underlying Nampula Complex basement. One of the samples has a second detrital cluster with ages between 550 to 650 Ma, thus providing a maximum, Late Neoproterozoic depositional age for the sequence. This sample also records metamorphic rims at ~550 Ma. Detrital Neoproterozoic zircons were not present in the population from the second Mecubúri Group sample, which instead recorded metamorphic rims at ~550 Ma. Neither of the Mecubúri Group samples recorded the young, ~490 Ma metamorphism seen in the Alto Benfica Group samples.

The preliminary conclusions from this study are that a) the Mesoproterozoic (1150 to 1000 Ma) Nampula Complex is overlain by two spatially separated sequences of significantly younger metasedimentary rocks, with the Alto Benfica Group deposited after ~900 Ma and the Mecubúri Group deposited after ~550 Ma; b) the two groups have different provenances and underwent metamorphism at different times. Further investigation of the two sequences into their depositional environments and their tectono-metamorphic significance for the later evolution of the Pan-African Orogeny in Mozambique are underway.