



Differential decay of the East-African Antarctic Orogen : an integrated examination of Northeastern Mozambique

K. Ueda (1), J. Jacobs (1), B. Emmel (1), R. J. Thomas (2), and R. Matola (3)

(1) Department of Earth Science, University of Bergen, Norway (kosuke.ueda@geo.uib.no/+47 5558 3660), (2) British Geological Survey, Keyworth, UK, (3) Direcção Nacional de Geologia, Maputo, Mozambique

In Northeastern Mozambique, the late Proterozoic - early Paleozoic East African-Antarctic Orogen can be subdivided into two major blocks that exhibit some relevant differences. The line of divide is represented by the Lurio Belt, a kinematically poorly constrained shear zone that also marks the conceptual northern limit of frequent late-tectonic granitoid intrusions. Moreover, far-travelled granulite-facies nappes cover a much larger area north of this belt (Viola *et. al.*, 2008), giving rise to the assumption of different exhumation and present exposure levels. U/Pb data from previous surveys (e.g., *Norconsult consortium*, 2007) show coeval high-grade metamorphism in the whole region between c. 610 - 550 Ma, while the block south of the Lurio Belt also shows continuing metamorphism until c. 490 Ma that can be related to extension. Geothermobarometry for samples from within the Lurio Belt (Engvik *et. al.*, 2007) indicates rapid exhumation after high-pressure granulite facies metamorphism and is consistent with the assumption of long tectonic activity. A possible model for the outlined pattern is the delamination of the orogenic root only in the southern part, followed by rapid mechanical thinning as well as by isostatic accommodation along the Lurio Belt.

A valuable marker was identified in the metasedimentary Mecuburi group that overlies the southern basement. U/Pb analysis of detrital zircons have yielded a maximum deposition age of c. 600 Ma, while metamorphism is recorded until c. 505 Ma. Investigations of the relationship between metasediments and older basement show that the basal contact is a fairly preserved depositional contact, allowing to suppose a conjoint post-depositional evolution. It is notable that the timing of deposition shortly follows the onset of the main, widespread high-grade metamorphism. Relatively high but variable degrees of migmatisation in the Mecuburi Group require a phase of burial from surface to deep levels after 600 Ma, followed by rapid exhumation latest at c. 505 Ma. Broad structural coherence between the Mecuburi group and the underlying Mesoproterozoic basement of the Nampula Complex shows that the fabric of the latter mainly records late Proterozoic to early Paleozoic deformation, potentially obliterating any older imprints. The coherence rather suggests that Mesoproterozoic units were not completely autochthonous, but significantly involved in continental collision during Gondwana assembly. Equivalent patterns of spaced, ductile and melt-bearing shear-zones from both the Mecuburi Group and the Nampula Complex furthermore suggest that extension in the southern block occurred temporally close to migmatisation, which in turn might have been promoted by heat flux increase at lower crustal levels as a result of delamination. Differential cooling of the northern and southern block is well evident in low-grade thermochronology. Apatite fission-track ages are consistently younger south of the Lurio Belt than they are to the north. However, this might rather reflect reactivation coeval with the late Jurassic - Early Cretaceous opening of the Mozambique basin along the similarly oriented passive margin than a continuation of accommodation movement following early Paleozoic delamination.

Engvik, A., Tveten, E., Bingen, B., Viola, G., Erambert, M., Feito, P., De Azavedo, S., 2007. P-T-t evolution and textural evidence for decompression of Pan-African high-pressure granulites, Lurio Belt, north-eastern Mozambique. *J. metamorphic Geol.* 25, 935-952.

Norconsult consortium, 2007. Mineral resources management capacity building project, Republic of Mozambique; component 2: Geological infrastructure development project, Geological Mapping Lot 1; Sheet explanation: 32 sheets; scale 1:250'000, 778 pp. + annexes. Credit No. NDF335, Report No. B6.f., National Directorate of Geology, Republic of Mozambique.

Viola, G., Henderson, I.H.C., Bingen, B., Thomas, R.J., Smethurst, M.A., de Azavedo, S., in press. Growth and collapse of a deeply eroded orogen : Insights from structural, geophysical, and geochronological constraints on the Pan-African evolution of NE Mozambique. *Tectonics* 27, TC5009, doi:10.1029/2008TC002284.