

LATE-TECTONIC EVOLUTION OF THE EAST-AFRICAN-ANTARCTIC OROGEN IN NORTHERN MOZAMBIQUE

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Comprehensive efforts in re-mapping the geology of Northern Mozambique during the past few years have led to a large improvement of the available base data (Norconsult consortium 2007) and have shed light on further interesting topics. Here, we present the progress of follow-up studies on the late post-collisional tectonics in the East-African-Antarctic Orogen (EAAO) after Gondwana assembly. We aim to identify and quantify extensional structures and their distribution, and to test whether ages from multi-technique analyses gain different cooling paths across major structures, particularly across the Lurio Belt.

In the prolonged orogenic history of the EAAO, late tectonic phases are most clearly recognised in the youngest units, like in syn-tectonic sediments and intrusions, which are therefore potentially good markers. Projections of structures from the Mecuburi meta-sediments dated to < 600 Ma into the underlying basement (Norconsult consortium 2007) show that the vast majority of them has most probably been formed during late Proterozoic / early Palaeozoic times and shaped the appearance of the basement. This includes the main foliation. Deep burial prior to the present exhumation level of middle to maybe lower crust are depicted by moderate to high degrees of migmatisation throughout the Nampula complex, but also in the overlying Mecuburi Group, where even local transition to unfoliated granitic bodies has been observed.

The transition to or the overprint by the boundary of the Nampula complex, the high-strain Lurio Belt (Viola et al, in press), is partly indistinct, due to limitations of exposure and probably due to anastomosing shear distribution. However, the occurrence of late-tectonic intrusions in the marginal area facilitates connections between deformation and emplacement of these granitoids. Although enduring magmatic activities locally both pre- and post-date the shear fabric of the Lurio Belt, the observed deformation of a previously dated intrusion (538 ± 10 Ma; Norconsult consortium, 2007) provides strong evidence that the Lurio Belt was not only active after that time, but that later strain increments were large enough to produce the mylonitic ribbon-quartz texture characteristic for the belt. In addition, the yielded age represents not the original magmatic emplacement, but already a later migmatisation.

There are now considerable indications that the majority of structures and textures originated from the latest orogeny (EAAO) and is not Mesoproterozoic. Late tectonic activity on many scales from the Lurio Belt to spaced shear zones in migmatites are possibly related to extension in response to orogenic collapse.

Geochronological analyses in preparation are expected to provide constraints on the vertical movement and to discriminate whether exhumation histories are different north and south of the Lurio Belt. Should that be the case, this might be the result of partial delamination of the orogenic root in the southern part, and would be matched well by the more wide-spread

occurrence of late intrusions in that area (Jacobs et al., in press). Ar/Ar-dating of Hbl, Bt and Musc, U/Pb ICPMS analyses of titanite, and SIMS dating of selected zircons are in progress and an integral part of the research activities, delivering compound cooling paths.

Figures

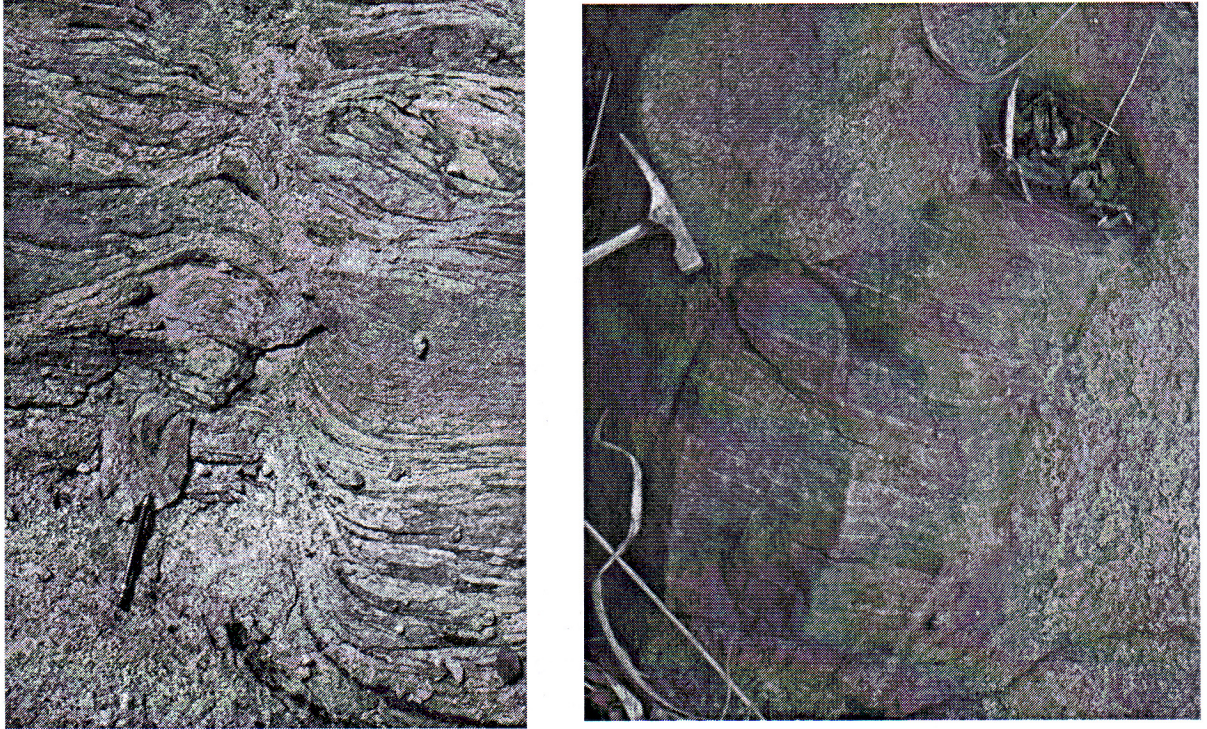


Figure 1: Stretched pebbles of the Mecuburi meta-conglomerates deformed by later ductile shear-zone. Pencil for scale.

Figure 2: Block of granulite from the Ocuá complex within the Lurio Belt, embedded in a post-kinematic granite.

References

- Jacobs, J., Bingen, B., Thomas, R.J., Bauer, W., Wingate, M.T.D., Feitio, P., in press. Early Palaeozoic orogenic collapse and voluminous late-tectonic magmatism in Dronning Maud Land and Mozambique: insights into the partially delaminated orogenic root of the East African - Antarctic orogen? In: M. Satish-Kumar, Y. Motoyoshi, Y. Osanai, Y. Hiroi, K. Shiraiishi (eds) *Geodynamic Evolution of East Antarctica: A Key to East-West Gondwana connection*. Geological Society of London Special Publications 308.
- 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*.