

CRUSTAL ARCHITECTURE OF THE MOZAMBIQUE BELT IN NORTHEASTERN MOZAMBIQUE: PERSPECTIVE FROM U-PB GEOCHRONOLOGY AND LU-HF ISOTOPES IN ZIRCON

B. Bingen¹, G. Viola¹, W. L. Griffin², J. Jacobs³, R. Boyd¹, R.J. Thomas⁴, E. Daudi⁵, I.H.C. Henderson¹, E. Beyer², Ø. Skar¹, A. Engvik¹, R.M. Key⁴, A. Solli¹, J.S. Sandstad¹, M. Smethurst¹, E. Tveten¹, T. Bjerkgård¹, V.A. Melezhik¹, D. Jamal⁶, R. Smith⁴, L.M. Hollick⁴, P. Feito⁵

1. Geological Survey of Norway, 7491 Trondheim, Norway, bernard.bingen@ngu.no
2. Department of Earth and Planetary Sciences, Macquarie University, NSW 2109 Australia
3. Department of Earth Science, University of Bergen, 5007 Bergen, Norway
4. British Geological Survey, NG125GG Keyworth, UK
5. National Directorate for Geology, Maputo, Mozambique
6. Eduardo Mondlane University, Maputo, Mozambique

Reconnaissance geological mapping was performed at 1:250000 scale over 31 degree-square sheets in NE Mozambique (Norconsult Consortium 2007), supported by airborne magnetic and radiometric surveys, U-Pb geochronology of zircon and monazite by LA-ICPMS and SIMS in 80 samples, and Lu-Hf isotope data on zircon by LA-MC-ICPMS in 32 samples. The study has led to a new tectonostratigraphic model of the area and to improved understanding of the relationships between the Mozambique, Zambezi, Irumide and Dronning Maud Land belts.

The area hosts the WSW-ENE trending, NNW-dipping, Lurio belt, a major linear Pan-African structure which gradually disappears westwards, and contains 557 ±16 Ma high-P granulite boudins, evidence for deformation between 587±23 and at least 532±13 Ma and abundant 612±6 to 504±11 Ma felsic plutons.

NW of the Karoo-aged Maniamba graben, the Palaeoproterozoic Ponta Messuli Complex preserves a low-P 1950±15 Ma metamorphism and was intruded by 1056±11 Ma granite, with an Archaean Hf model age ($\epsilon\text{Hf} = -15$). This complex is related to the Irumide and Usagaran belts at the margin of the Congo-Tanzania craton. It is overlain by the Txitonga Group, which contains 714±17 Ma felsic volcanics with $\epsilon\text{Hf} = -6$, and is interpreted as a Neoproterozoic rift sequence deposited along this margin. SW of the Maniamba graben, the Meso- to Neoproterozoic Unango and Marrupa Complexes consist of 1062±13 to 949±13 Ma felsic orthogneiss with Palaeo- to Mesoproterozoic Hf model ages ($-11 < \epsilon\text{Hf} < +7$). They show 962±18 Ma Grenvillian metamorphism (granulite-facies in Unango), 799±8 Ma alkaline plutons, 551±6 to 536±6 Ma Pan-African metamorphism, 547±14 to 486±27 Ma granite plutons, and SW-NE trending 444 ±5 Ma ultramylonites close to the Maniamba graben. The two Complexes can be interpreted as an extension of the southern Irumide belt, linking the Zambezi and Mozambique belts.

The Marrupa Complex is overlain by a Pan-African Upper Nappe System (UNS) including, from NW to SE, the M'Sawize, Muaquia, Xixano,

Lalamo, Meluco and Montepuez Complexes. It consists of Neoproterozoic metasedimentary rocks, including marble, and comparatively juvenile magmatic suites, including 973±11 to 946±12 Ma mafic to felsic orthogneiss (M'Sawize, Muaquia, Meluco, $\epsilon\text{Hf} = +2$), 818±10 to 787±23 Ma metarhyolite-granite (Xixano, Montepuez), 744±11 to 735±4 Ma enderbite and granite (Xixano, $+4 < \epsilon\text{Hf} < +10$), 696±13 Ma granodioritic gneiss (Lalamo, $\epsilon\text{Hf} = +10$), and 631±11 to 579±27 Ma felsic plutons. The Upper Nappe System preserves two metamorphic phases at 735±4 Ma (granulite-facies, Xixano) and 631±6 to 607±11 Ma (M'Sawize, Xixano, Meluco). It correlates well with the Western Granulite nappes of Tanzania. The Upper Nappe System is interpreted as remnants of an early Pan-African collision zone (631–607 Ma), involving indigenous and accreted lithologies, and transported with top-to-NW kinematics onto the Congo-Tanzania margin between 596±11 Ma (youngest pluton in the nappes) and ca. 550 Ma (metamorphism in underlying Marrupa Complex). A large 744–735 Ma enderbite body in the Xixano Complex is regarded as the root of an accreted arc formed in the Mozambique ocean.

S of the Lurio belt, the Nampula Complex consists mainly of 1148±1 to 1028±7 Ma felsic orthogneiss ($+1 < \epsilon\text{Hf} < +4$), on average older and more juvenile than equivalent lithologies N of the Lurio belt. It is affected by 543±23 and 520±8 to 493±8 Ma metamorphism and hosts abundant 511±12 to 508±3 Ma granite plutons. It is covered by the clastic Mecuburi Group, and overlain by the Mugeba and Monapo klippen, possibly part of the Upper Nappe System. The Nampula Complex shows late Pan-African unroofing (post 493 Ma) and has clear affinity with the Dronning Maud Land belt. The status of the Lurio belt, as a Grenvillian or Pan-African suture zone, or none of the two, remains a matter of debate.

Reference

Norconsult Consortium, 2007. Mineral resources management capacity building project, Republic of Mozambique, Component 2: Geological infrastructure development project, Geological Mapping Lot 1, Report No. B6.f. Unpublished, 778 pp.