

CAMBRIAN POST-TECTONIC GRANITOID MAGMATISM IN THE SOUTHERN EAST AFRICAN-ANTARCTIC OROGEN

Robert THOMAS¹, Joachim JACOBS² and Kathryn GOODENOUGH³

¹ British Geological Survey, Keyworth, Nottingham, NG12 5GG, United Kingdom. E-mail: bthomas@bgs.ac.uk

² University of Bergen, Department of Earth Science, Allegaten 41, 5007 Bergen, Norway

³ British Geological Survey, West Mains Road, Edinburgh EH9 3LA, United Kingdom.

We present field, geochemical and geochronological data for late- to post-tectonic Cambrian granitoids from northeast Mozambique and East Antarctica, in the southern part of the Late Neoproterozoic–Early Palaeozoic East African–Antarctic Orogen (EAAO). The granitoids, which intruded predominantly high-grade Mesoproterozoic (ca 1 Ga) crust, have been described as A-type granitoids accompanying the late collapse of the southern part of the EAAO (e.g. Jacobs et al., 2008)

The late tectonic history of the southern part of the EAAO is characterized by lateral extrusion, extensional collapse and the emplacement of large volumes of high-temperature A2-type granitoids and charnockites. This late-tectonic igneous province covers an area of more than 15 000 km² in central and eastern Dronning Maud Land (East Antarctica) and its northerly continuation, in Gondwana reconstructions, as the Nampula Complex of northeast Mozambique. In Mozambique, the magmatic province is effectively bounded in the north by a tectonic zone known as the Lurio Belt. Secondary ionization mass spectrometry (SIMS) U–Pb analyses of zircons from two major late-tectonic granitoid intrusions from Dronning Maud Land indicate crystallization ages of 501±7 and 499 ± 4 Ma, whereas a major extensional shear zone was dated at 507±9 Ma. Geochronological analyses of a number of late-tectonic granitoid sheets and plutons from the Nampula Province, Mozambique, gave U–Pb zircon SIMS ages of 512 ± 4, 508 ± 4, 508 ± 2 and 507 ± 3 Ma respectively. Overall, the late-tectonic magmatism in this crustal domain can be bracketed between c. 530 and 485 Ma. It started with small gabbro bodies emplaced at c. 530–520 Ma, culminated with the intrusion of major granite–charnockite plutons at c. 510–500 Ma and terminated with the introduction of small volumes of sheet-like granite at c. 485 Ma.

The data from Mozambique and Antarctica demonstrate that extensional shearing and granitoid intrusion are synchronous, and that orogenic collapse and magmatism are related. The distribution, structural style, geochemical composition and age of this late-tectonic magmatic province have been ascribed to a process of partial delamination of the orogenic root south of the Lurio Belt in the southern third of the EAAO. However, in northern Madagascar, petrologically similar late-tectonic granitoids and charnockites of the Maevarano Suite have given U–Pb zircon SHRIMP dates between 537 ± 5 and 522 ± 6 Ma (Goodenough et al., this conference). This magmatism is thus broadly coeval with the early mafic magmatism in East Antarctica, but slightly older than the granitic magmatism in both Antarctica and Mozambique, perhaps indicating a slight younging in the granitoid–charnockite magmatic phases from north to south along the orogen. In its reconstructed Gondwana position, Madagascar lies north of the Lurio Belt, indicating that lithospheric delamination may have also occurred further north in the orogen.

Keyword: Mozambique, Antarctica, Madagascar, Post-tectonic granitoids.

Reference

- Jacobs, J., Bingen, B., Thomas, R.J., Bauer, W., Wingate, M., Feitio, P. (2008). Early Palaeozoic orogenic collapse and voluminous late-tectonic magmatism in Dronning Maud Land and Mozambique: insights into the partially delaminated root of the East African–Antarctic Orogen? In: *Geodynamic evolution of East Antarctica: a key to the East–West Gondwana connection* (M. Satish-Kumar et al., Eds.). Geological Society London, Special Publication 308, 69–90.