



## Invited Review

# Orogen styles in the East African Orogen: A review of the Neoproterozoic to Cambrian tectonic evolution <sup>☆</sup>



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## ABSTRACT

The East African Orogen, extending from southern Israel, Sinai and Jordan in the north to Mozambique and Madagascar in the south, is the world's largest Neoproterozoic to Cambrian orogenic complex. It comprises a collage of individual oceanic domains and continental fragments between the Archean Sahara–Congo–Kalahari Cratons in the west and Neoproterozoic India in the east. Orogen consolidation was achieved during distinct phases of orogeny between ~850 and 550 Ma. The northern part of the orogen, the Arabian–Nubian Shield, is predominantly juvenile Neoproterozoic crust that formed in and adjacent to the Mozambique Ocean. The ocean closed during a protracted period of island-arc and microcontinent accretion between ~850 and 620 Ma. To the south of the Arabian Nubian Shield, the Eastern Granulite–Cabo Delgado Nappe Complex of southern Kenya, Tanzania and Mozambique was an extended crust that formed adjacent to the Mozambique Ocean and experienced a ~650–620 Ma granulite-facies metamorphism. Completion of the nappe assembly around 620 Ma is defined as the East African Orogeny and was related to closure of the Mozambique Ocean. Oceans persisted after 620 Ma between East Antarctica, India, southern parts of the Congo–Tanzania–Bangweulu Cratons and the Zimbabwe–Kalahari Craton. They closed during the ~600–500 Ma Kuungan or Malagasy Orogeny, a tectonothermal event that affected large portions of southern Tanzania, Zambia, Malawi, Mozambique, Madagascar and Antarctica. The East African and Kuungan Orogenies were followed by phases of post-orogenic extension. Early ~600–550 Ma extension is recorded in the Arabian–Nubian Shield and the Eastern Granulite–Cabo Delgado Nappe Complex. Later ~550–480 Ma extension affected Mozambique and southern Madagascar. Both extension phases, although diachronous, are interpreted as the result of lithospheric delamination. Along the strike of the East African Orogen, different geodynamic settings resulted in the evolution of distinctly different orogen styles. The Arabian–Nubian Shield is an accretion-type orogen comprising a stack of thin-skinned nappes resulting from the oblique convergence of bounding plates. The Eastern Granulite–Cabo Delgado Nappe Complex is interpreted as a hot- to ultra-hot orogen that evolved from a formerly extended crust. Low viscosity lower crust resisted one-sided subduction, instead a sagduction-type orogen developed. The regions of Tanzania and Madagascar affected by the Kuungan Orogeny are considered a Himalayan-type orogen composed of partly doubly thickened crust.

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