

## **The Proterozoic evolution of the East African Orogen in Tanzania – a reconstruction based on the compilation of thematic maps**

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The East African Mobile Orogenic Belt stretches along the entire East African Coast from northern Egypt to South Africa and continues to the Antarctic. Its spatial size is comparable with the entire Alpine-Himalayan orogen. Its temporal evolution covers a range of the whole Proterozoic eon with several peaks of orogenic activity culminating in the consolidation of East- and West-Gondwana to the supercontinent around 500-650 Ma. Because logistic and political barriers hamper scientific investigations in Africa the whole East African Orogen is not well-understood. Outstanding questions are:

- (1) What are the terranes, continental slivers and oceanic fragments involved?
- (2) What are age domains of metamorphic, magmatic and structural provinces?
- (3) Which are the prevailing metamorphic conditions along the segment?
- (4) What were the successive kinematic events that finally led to orogen consolidation?
- (5) How do the prominent mineral resources relate to overall geodynamics?

A key area for the reconstruction of the East African Orogen in terms of these questions is located in Tanzania. There, deeply eroded Proterozoic sequences are found that evolved during two different orogenic events and are now juxtaposed to the Archean Tanzanian Craton.

These events are (1) the Paleoproterozoic Usagaran Orogeny (1.8–2.0 Ga) and (2) the Neoproterozoic events (550–800 Ma) also termed the Pan-African Orogeny. The Usagaran Orogen is a magmatic belt with steeply dipping sequences along the southern and south-eastern margin of the Archean Tanzanian Craton. The Pan-African Belt (also known as the Mozambique Belt in East Africa) was formed during westward accretion of East Gondwana units onto the West Gondwana continental margin. Both orogens are tectonically intercalated in a complex style and highly metamorphosed (granulite facies) leading to irregular and unclear terrane boundaries.

A first step to decipher the boundaries of different orogenic provinces was the compilation of available geological maps (until now ca. 100 quarter degree sheets) to a simplified tectonic map from Tanzania with layers on lithology and structural geology (strike, dip, lineation). Through all our studies we use an integrated approach of different methods (structural geology, geochemistry, geochronology and metamorphic petrology) in different scales for the collection of

large scale area-wide databases. Those datasets expand the tectonic map of Tanzania and allow creating layers of thematic maps (e.g. metamorphic maps, resource maps, terrane maps).

In Central Tanzania this approach allowed to constrain the geometry of terrane boundaries between the Usagaran Belt and the Mozambique Belt. A sequence of deformational and metamorphic events could be described for different tectonic units and interpreted in cross section and in map view over an area of 400x400 km. Details can be found in Fritz et al. (2005).

The current research area is North-Tanzania – a largely unexplored region in terms of Proterozoic geology. First results of the lithological and structural map compilation have shown that the structural style (which is mainly governed by the shape of the Tanzania Craton) changes significantly between the Central Tanzanian part and North-Tanzania. In the Central part of the Mozambique Belt westward thrusts dominate that are intersected by the Central Tanzanian Shear Belt (CTSB) along the southern margin of the Tanzanian Craton. In the Northern part complex structures of large-scale fold patterns (and re-fold structures) dominate. The transition between the Northern and Central tectonic style is dominated by an arcuate ductile wrench zone transferring the whole Mozambique Belt and obliterating the initial shape of sutures and terrane boundaries.

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Fritz, H., Tenczer, V., Hauzenberger, C.A., Wallbrecher, E., Hoinkes, G., Muhongo, S., Mogessie, A., 2005. Central Tanzanian Tectonic Map (CTTM): A step forward to decipher Proterozoic structural events. *Tectonics*, Vol. 24, No. 6, TC6013.