

## **Consolidation of East Africa: From Paleoproterozoic island arc to Neoproterozoic collision**

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The East African Orogen is a north south striking belt that finally consolidated during collision of West- and East-Gondwana fragments. The Neoproterozoic part of the mobile belt, known as Mozambique Belts, can be traced from Egypt southwards to Mozambique exposing upper crustal sequences in the northern part and lower crustal sequences in the south. In Tanzania, the Neoproterozoic orogenesis with ages clustering around 600 Ma reworked a Paleoproterozoic orogen belt, the Usagaran Belt, dated around 1.9 Ga. Both belts accreted onto the ca. 2.5 Ga old Tanzanian Craton, hence a long lasting accretion history spanning over ca. 1.3 Ga is recorded in the East African Orogen.

Stages of Paleoproterozoic events include: (1) Exhumation of granulite facies metamorphosed rocks prior to 1.9 Ga within a wrench tectonic setting, (2) Intrusion of island arc magmatics and deposition of volcanosedimentary sequences (Ndembera volcanics) around 1.9 Ga. (3) Subduction and eclogite formation followed by Paleoproterozoic exhumation. In summary the Paleoproterozoic convergence between the Archean Tanzanian and probably Zimbabwe Cratons led to extraction of melts in intervening island arcs amalgamating to the Usagaran/Ubendian orogenic belt. The Craton served as a rigid indenter with a subduction zone along the eastern Tanzanian Craton margin. Coevally, a large dextral strike-slip belt (Tungamalenga Shear Belt) evolved along the southern Craton margin in the stress shadow of the Craton. Coeval emplacement of large volumes of syn-tectonic granitoids softened the crust and facilitated distributed shear across the whole Paleoproterozoic orogen belt. Within the Paleoproterozoic Usagaran Belt melt enhanced strike slip deformation of hot crust without significant horizontal displacement evolved.

Stages of Neoproterozoic events include: (1) Extraction of anorthosite melts during the convergence stage around 800 Ma (Tenczer et al., 2006), (2) westward thrust propagation during the continental collision stage around 640 Ma, and (3) strike-slip deformation coeval with extension around 600 Ma (Fritz et al., 2005). Paleoproterozoic structures acted as stress guide during Neoproterozoic continental collision between West- and East Gondwana fragments. The hundreds of kilometres long dextral Central Tanzanian Shear Belt (CTSB) evolved parallel to the southern margin of the Tanzanian Craton and reactivated parts of the Tungamalenga Shear Belt. The CTSB clearly separates domains of dif-

ferent tectonic style within the Neoproterozoic Mozambique Belt. Thrust tectonics with forward and upward propagation of thrusts is recorded north of the CTSB. Strike-slip deformation acted at different crustal levels south of the CTSB. The flow line geometry within the southern shear domain is attributed to crustal scale counterflow around the curved rigid foreland. Studies on metamorphic textures, lattice preferred orientation and rock rheology demonstrate a continuous gradient in syn-tectonic metamorphic conditions along the CTSB. Deformation at shallow crustal levels is dominant in western portions of the shear belt with brittle deformation mechanisms associated with highly localized and partitioned shear. Central portions exhibit subgrain and grain boundary migration deformation mechanisms and distributed shear. Diffusion processes in the East are compatible with lower crustal shear at granulite facies metamorphic conditions. This goes along with gradually eastward deepening of the basal decollement level within the thrust dominated belt. In summary the Neoproterozoic tectonics is characterized by large horizontal displacements that partitioned along a curved continental margin.

Two different geodynamic processes are distinguished that finally formed the East African Orogen in Tanzania, a Paleoproterozoic island arc tectonic style with melt enhanced strike-slip deformation of hot lithosphere. Neoproterozoic continental collision tectonic style formed nappes in a thick skinned tectonic style with nappe roots at the base of the crust. The geometry of both orogen types is strongly governed by the shape of the Archean Tanzanian Craton and response of displacement partitioning along a curved rigid continental margin.

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