



Two Orogens - one Shear Belt: 1 Ga of repeated deformation along the Central Tanzanian Shear Belt

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The Central Tanzanian Shear Belt (CTSB) is a major tectonic lineament within the East African Orogen in Tanzania that extends in W-E direction over some 100 kilometres and penetrates the entire Proterozoic crust. The shear belt initiates south of the Archean Tanzania Craton, transects the Paleoproterozoic Usagaran orogen belt and the Neoproterozoic Mozambique Belt and has been repeatedly active between Paleoproterozoic (1.8 - 2.0 Ga) and Neoproterozoic (0.6 Ga) orogenic periods (Fritz et al., 2005). The CTSB is considered as an example where overall geodynamics and mechanical properties have changed with time and space. During the Paleoproterozoic Usagaran orogeny shearing was associated with enhanced heat flow, magmatic activity and deformation in softened crust. The geodynamic setting is characterized by oblique accretion of island arcs in a transcurrent tectonic setting. By contrast the shear deformation during the Neoproterozoic Mozambique orogeny occurred during thickening of continental crust within a mechanically stronger crust. Along strike of the Neoproterozoic CTSB we performed a systematic study on deformation mechanisms, lattice preferred orientation and vorticity to constrain styles in different crustal levels of the shear belt. From West to East we observed a gradual change in syntectonic metamorphic conditions from greenschist facies over amphibolite to granulite facies condition. This goes along with change in tectonic style from localized simple shear dominated flow in shallow crustal levels to distributed pure shear dominated flow in the deep crust. Simultaneously, deformation mechanisms change from sub-grain rotation over grain boundary migration to diffusion driven mechanism in quartz and feldspar. Accordingly lattice preferred orientation patterns display a variation of dislocation glide and climb processes at various temperature conditions. The geometry of both, the Paleoproterozoic and the Neoproterozoic CTSB is governed by the

strength and circular shape of the Tanzania Craton. Oblique Paleoproterozoic island arc accretion released in tensional structures at low stress segments around the Craton giving space to magma emplacement. The Neoproterozoic CTSB is interpreted as a release structure (counterflow shear zone) that evolved during overall crustal thickening in the stress shadow of the indenting Tanzania Craton. This counterflow shear zone penetrated the upper crust in the west (Craton margin) and extends to the crust / mantle boundary in the eastern orogen root zone.

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References: H. Fritz, V. Tenczer, C. A. Hauzenberger, E. Wallbrecher, G. Hoinkes, S. Muhongo, A. Mogessie 2005: Central Tanzanian tectonic map: A step forward to decipher Proterozoic structural events in the East African Orogen.- *Tectonics* 24, No. 6, TC6013 doi:10.1029/2005TC001796.