



Geological Thematic Maps: A tool for a better understanding of geodynamic processes - Case study of the East African Orogen in Tanzania

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The Mozambique Belt (MB) in Central Tanzania is a N-S oriented Neoproterozoic mountain range. It is part of the East African Orogen, that formed by the collision of East and West Gondwana between 640 and 550 Ma. Collision led to a westward accretion of the Mozambique Belt onto the Archean Tanzania Craton (2.5-2.5 Ga). Along the southern margin of the Tanzania Craton a Paleoproterozoic orogenic belt - the Usagaran Belt (1.8-2.0 Ga) is squeezed between the Craton and the Mozambique Belt. A complex structural and metamorphic intercalation of both orogenic belts was the result. A large part of these Proterozoic sequences is deeply eroded and mainly deep crustal rocks (high-pressure granulites) are exposed. The structural complexity and polymetamorphism at deep crustal conditions hamper a straightforward reconstruction of the Mozambique Belt. Therefore a geological map is essential for such a study involving aspects of modern earth sciences. e.g. in our case this is a map with a layered structure that contains themes such as formation ages, geochemical, geochronological and structural databases overlaying the lithological information of the different Proterozoic units. From Tanzania a collection of Quarter Degree Sheets (QDS) of geological maps is available from most regions but these are too small to interpret geodynamic processes. The Quarter Degree Sheets are of different quality - some published from mapping missions in the 1950s and 1960s with excellent quality - some simple hand drawings. As a first step we compiled the geological maps from a study area in central Tanzania (6°S - 9°30'S and 34°30'E - 38°30'E) in order to reconstruct the structural boundary between the Paleoproterozoic Usagaran Belt and the Neoproterozoic Mozambique Belt. A distinction between metamagmatic and

metasedimentary units was made and transferred to the newly-drawn Central Tanzanian Tectonic Map (CTTM) (Fritz et al., 2005). Metasedimentary units were further subdivided into metapelitic and metapsammitic rocks. This simple approach turned out to be extremely useful as the geometry of various key areas became structured and visible for the first time. A second step was the transfer of strike lines from the individual map sheets to the CTTM. This led to the recognition of major shear belts that have never been visualized before. The W-E trending Central Tanzanian Shear Belt (CTSB) that can be traced over 100s of km from upper to lower crustal levels in Proterozoic sequences. A verification of this shear belt in the field allowed understanding the role of the Tanzanian Craton as rigid indenter governing the structural evolution in the juxtaposed orogens. Furthermore it could be shown that the CTSB was active during both Proterozoic orogenies. The CTSB separates different structural provinces that could only be recognized by the compilation of the map. Different structural and metamorphic provinces were assigned to certain “key-areas” that were separately studied in detail with structural, petrological, geochemical and geochronological methods. This combined approach applied on the Thematic Map on Proterozoic geology enhanced the knowledge. It allowed recognizing in summary 4 large crustal shear belts in the Proterozoic, the spatial distribution of rocks from different crustal provinces from East and West Gondwana, the geometry of different Proterozoic age provinces and all these things in map view and cross section with a better resolution than during the last decades (Fritz et al., 2005). This study is supported by the FWF Project T247-N10.

References:

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 Pre Pan-African and Pan-African structural events. *Tectonics*, Vol. 24, No. 6, TC6013.