

Tectono-metamorphic evolution of the Kibuye-Gitarama-Gatumba area (Rwanda): using petrochronology to unravel the geodynamic framework of the Karagwe-Ankole Belt

Johanna Van Daele (1), Dominique Jacques (1), Niels Hulsbosch (1), Stijn Dewaele (2), and Philippe Muchez (1)

(1) KU Leuven, Department of Earth and Environmental Sciences, Leuven, Belgium, (2) Ghent University, Department of Geology, Ghent, Belgium and Royal Museum for Central Africa, Department of Geology and Mineralogy, Tervuren, Belgium

The Mesoproterozoic Karagwe-Ankole Belt (KAB) extends from Burundi over Rwanda and NW-Tanzania to S-Uganda (Central Africa). The integration of the metamorphic and magmatic evolution of this orogenic belt in a consistent geodynamic framework is still controversial. Additionally, geochronological information on the deformation phases is limited. This tectono-metamorphic model is, however, a crucial component in the understanding of the Meso- to Early Neoproterozoic mineralization processes.

A detailed structural mapping of road and river transects was performed in the Kibuye-Gitarama-Gatumba area (West Rwanda) to determine the deformation history of the KAB. Structural analyses and petrographic studies identified two main compressive deformation phases. A locally observed foliation with a N45W-N50W orientation is interpreted as the consequence of a first compressional phase (D1, shortening direction N40E-N45E). Additionally, a well-developed crenulation cleavage and a regionally pervasive foliation were found. The cleavage and foliation have an orientation of N20W-N30W (exceptionally N20E) and are indicative of a second compressional phase (D2) with an EW shortening direction. Final extension (D3) along a N30W-N10E direction resulted in boudinage and joint development.

Fieldwork observations combined with known ages of the granites in the KAB indicate that D1 and D2 took place prior to 986 Ma while D3 is younger than 986 Ma. Based on thin section petrography, a petrochronological strategy was outlined to fill in the gaps of the currently broadly defined timeframe. The regional metamorphic grade of the study area is upper greenschist, with the formation of muscovite, biotite, chlorite, garnet, staurolite and cordierite. The main penetrative tectonic foliations (D1 and D2) are expressed by the preferential orientation of muscovite or biotite. In some cases, muscovite growing along the crenulation cleavage (syn-D2) was observed. Furthermore, pre- and syn-D2 garnets were identified. Different generations of quartz veins (post-dating D3) contain muscovite, garnet and/or biotite. These minerals provide excellent dating possibilities (Ar-Ar, in-situ Rb-Sr and Sm-Nd).

The obtained results will be used to refine the chronological aspects of the deformation history of the KAB. Furthermore, these data will be combined with regional structural data, petrographic and geothermobarometric analyses to reconstruct the tectono-metamorphic evolution of the Karagwe-Ankole Belt, which will allow to obtain a better insight in the geodynamic evolution and the ore-forming processes.