

# **Metallogeny of the Kundelungu Group in the Lufilian arc (Congo Copperbelt): insight of fluid evolution and its geodynamic context**

Pascal MAMBWE<sup>1,2</sup>; Stijn DEWAELE<sup>3,4</sup>; Louis KIPATA<sup>2</sup> & Philippe MUCHEZ<sup>1</sup>

*1KU Leuven, Department of Earth and Environmental Sciences, Celestijnenlaan 200E, B-3001 Leuven, Belgium*

*2University of Lubumbashi, Department of Geology, Lubumbashi, BP 1825, DR of Congo*

*3Royal Museum for Central Africa, Department of Geology and Mineralogy, Leuvensesteenweg 13B-3080 Tervuren, Belgium*

*4Ghent University, Department of Geology, Krijgslaan 281 S8, B-9000 Gent, Belgium*

*Corresponding authors: [p.mambwe@sciencesunilu.ac.cd](mailto:p.mambwe@sciencesunilu.ac.cd)*

*Key words: Cu mineralization, Kundelungu Group, Lufilian arc, Katangan Supergroup*

## **Abstract**

The Neoproterozoic Katangan Supergroup in the Central African Copperbelt hosts Cu-Co and vein-type Cu-Ag-Zn-Pb deposits. The Roan Group contains stratiform and stratabound Cu-Co deposits, while stratiform and vein-type deposits can be found in both the Nguba and Kundelungu Groups (Haest and Muchez, 2011). Several studies have highlighted the fluid evolution in the Katanga Copperbelt. In the Roan Group along the Lufilian arc, two main hypogene Cu-Co sulfide phases precipitated from hydrothermal fluids during early diagenesis and during late diagenetic to synorogenic stages (see El Desouky et al., 2009). In the Nguba Group, post-orogenic hydrothermal fluids have been recognized at Kipushi Cu-Pb-Zn (Heijlen et al., 2008). Microthermometric data of fluid inclusions from deposits in the Katangan foreland characterize the fluids responsible for syn- to post orogenic mineralization in the Nguba and Kundelungu Groups (El Desouky et al., 2008a, b; Haest et al., 2009).

Copper mineralization is also found in different formations of the Kundelungu Group along the Lufilian arc, such as at Diyenge in the Kyandamu and Lusele formations, Kyaundji in the Lusele Formation, Shangoluwe in the Kanianga and Mongwe formations, Kamanyingo in the Kiubo and Sampwe formations. Presently, only the Shangoluwe Cu deposit located in the Kambove region has been investigated in detail (Mambwe et al., 2017a). The Kundelungu Group in the Lufilian arc has been poorly studied compared to the foreland and the metallogeny and the evolution of the hydrothermal fluids in these deposits is largely unknown. The aim of this newly started research project (on going in the Geodynamic and Geofluids Research Group at the KU Leuven) provides multiple aspects of investigation: 1) define the geodynamic context of the mineralization based on the brittle structural deformation model of Kipata et al. (2013); 2) specify the fluid flow context with reference to the foreland (Haest et al., 2009; El Desouky et al., 2008a, b); 3) determine the petrography and mineral paragenesis; 4) define the nature and origin of the fluids in the Kundelungu Group; and 5) establish a possible correlation with the

fluid migration through both Roan and Nguba groups (Dewaele et al., 2006; Mambwe et al., 2017b). The results of this research will allow to characterize the fluid evolution and to propose a genetic model. Moreover, it can contribute to the exploration for new copper deposit in the African Copperbelt.

## References

Dewaele, S., Muchez, Ph., Vets, J., Fernandez-Alonzo, M. & Tack, L., 2006. Multiphase origin of the Cu-Co deposits in the western portion of the Lufilian fold-and-thrust belt, Katanga (Democratic republic of Congo). *Journal of African Earth Sciences*, 46, 455-469.

El Desouky, H., Muchez, Ph., Boutwood, A. & Tyler, R., 2008a. Postorogenic origin of the stratiform Cu mineralization at Lufukwe, Lufilian Foreland, Democratic Republic of Congo. *Economic Geology*, 103, 555-582.

El Desouky, H.A., Muchez, Ph. & Tyler, R., 2008b. The sandstone-hosted stratiform copper mineralization at Mwitapile and its relation to the mineralization at Lufukwe, Lufilian foreland, Democratic Republic Congo. *Ore Geology Reviews*, 34, 561-579.

El Desouky, H.A., Muchez, Ph. & Cailteux, J., 2009. Two Cu-Co sulfide phases and contrasting fluid systems in the Katanga Copperbelt, Democratic Republic of Congo. *Ore Geology Reviews*, 36, 315-332.

Haest, M. & Muchez, Ph., 2011. Stratiform and vein-type deposits in the Pan-African Orogen in Central and Southern Africa: Evidence for multiphase mineralization. *Geologica Belgica*, 14, 23-44.

Haest, M., Muchez, Ph., Petit, J.C.J. & Vanhaecke, F., 2009. Cu isotope ratio variations in the Dikulushi Cu-Ag deposit, DRC: Of primary origin or induced by supergene reworking? *Economic Geology*, 104, 1055-1064.

Heijlen, W., Banks, D.A., Muchez, Ph., Stensgard, B.O.M. & Yardley, B.W.Y., 2008. The nature of mineralizing fluids of the Kipushi Zn-Cu deposit, Katanga, Democratic Republic of Congo: Quantitative fluid inclusion analysis using laser ablation ICP-MS and bulk crush-leach methods. *Economic Geology*, 103, 1459-1482.

Kipata, M.L., Delvaux, D., Sebagenzi, M.N., Cailteux, J. & Sintubin, M., 2013. Brittle and stress field evolution in the Pan-African Lufilian and its foreland (Katanga, DRC): from orogenic compression to extensional collapse, transpressional inversion and transition to rifting: *Geologica Belgica*, 16, 001-017.

Mambwe, P., Kipata, M.L., Chabu, M., Muchez, Ph., Lubala, R. T., Jébrak, M. & Delvaux, D., 2017a. Sedimentology of the Shangoluwe breccias and timing of the Cu mineralization (Katanga Supergroup, D. R. of Congo). *Journal of African Earth Sciences*, 132, 1-15.