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Lithogeochemistry, petrological modeling and possible LIP classification of the ca. 750-740 Ma mafic intrusive rocks of the Central African Copperbelt, Zambia and D.R.C.

RAFAEL RACHID BARBIERI BACHA[1], JAMES E. MUNGALL[1] AND RICHARD E. ERNST[1,2]

[1]Carleton University

[2]Tomsk State University

Presenting Author: rafaelbacha@cmail.carleton.ca

The mafic intrusive rocks of the Neoproterozoic Central African Copperbelt (CACB) are unevenly distributed throughout the 450 km long and 600 km wide arcuate Katangan basin, located in the southeastern part of the Democratic Republic of Congo and northwestern part of Zambia. Lithogeochemical data suggest that these rocks were formed in an extensional regime developed during the rifting stage of the CACB, which resulted in the upwelling of the asthenospheric mantle. Consequently, these rocks derived from primitive magmas and evolved chemically through fractional crystallization and assimilation, generating a range of compositions with close chemical affinity. Our data, combined with previously published datasets, indicate that continental tholeiites were emplaced in Paleoproterozoic crust during the initial stages of continental break-up, followed by a combination of tholeiitic and alkaline rocks emplaced in a continental rift, finally succeeded by tholeiitic rocks with E-MORB affinity indicating a possible incipient oceanic rift analogous to today's Red Sea.

AlphaMELTS [1] petrological modeling suggests that a starting picritic composition with mild OIB affinity (Sample 7 [2]) could evolve to the gabbroic rocks presently occurring in the CACB through fractional crystallization. Assimilation of upper continental crust [3] contributed to achieving compositions similar to those of the intrusive mafic rocks of the CACB.

Large igneous provinces are known to be enormous volumes of magma typically emplaced over a short period of time. Therefore, due to: (1) presumed loss of volcanic rocks by erosion and underestimated volume of intrusive igneous rocks in the CACB, (2) limited U-Pb zircon geochronological data with a relatively large error (ca. 750-740 Ma), and (3) similarity of the chemical composition of the CACB intrusive rocks with rocks from other LIPs worldwide (CAMP, Newark Basin; Paraná-Etendeka, Urubici; Biscotasing, Ungava; and Vestfjella, Karoo) [4], it is possible that these rocks may represent part of a LIP event.

[1] Smith & Asimow (2005), *Geochemistry Geophysics Geosystems* 6(1), 1-8.

[2] Lightfoot (1999), *Ontario Geological Survey* Open File Report 5998, 57 p.

[3] Taylor & McLennan (1995), *Reviews of Geophysics* 33(2), 241-265.

[4] Pearce et al. (2021), *Lithos* 392-393, 106068.