

## Syn- to post-orogenic granitoid magmatism in the Irumide belt of Zambia: geochemical evidence

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**Abstract** - A major part of the Irumide belt in northern Zambia consists of granitic rocks, which on the basis of field relationships are distinguished into several distinct suites. The oldest suite of granites consists of medium-grained homogeneous leucocratic granite gneiss. A second suite consists of weakly deformed, porphyritic biotite granites, which contain abundant xenoliths of the earlier granites and metasedimentary rocks. The third group consists of homogeneous medium-grained undeformed biotite granites. Preliminary zircon SHRIMP dating on the suite of porphyritic and medium-grained granites, indicates an intrusion age of *ca* 1020 Ma. An attempt to date the older granite gneiss yielded a wide range of ages from *ca*. 2020 Ma and *ca*. 900 Ma, indicating the presence of inherited zircon populations and U-Pb loss during subsequent metamorphism.

The major element chemistry of the granites indicates that the rocks are meta- to peraluminous. The granites from the different suites have markedly similar major and trace element characteristics exemplified by high  $K_2O$  and HFSE contents, relatively flat HREE and moderate to steep LREE patterns as well as pronounced negative anomalies on Nb, Ti, P and Sr. A moderate negative Eu anomaly in the REE patterns suggests plagioclase fractionation to be an important process in the genesis of the granite suites. Tectonic discrimination on the basis of trace element patterns indicates that the granitic suites are syn- to post orogenic. The geochemical features shown by the granitoids are interpreted to indicate that petrogenetic processes remained uniform through the different tectonic stages shaping the belt, and that all of these processes involved, to a lesser or greater extent, melting of a calc-alkaline lower crustal source.

**Key words** - meta-, peraluminous granites, plagioclase fractionation, calc-alkaline lower crust

### INTRODUCTION

The Mesoproterozoic geological history of Zambia is preserved in several geological terrains, the most significant being the Irumide belt and the Choma-Kalomo block. The Irumide belt (Ackermann, 1950; Ackermann and Forster, 1960) is a 1 000 km long, NE-SW trending region of crystalline metamorphic and metasedimentary rocks, covering the eastern part of Zambia (Fig. 1). The northern and northwestern foreland of the Irumide belt consists of Palaeoproterozoic granite gneisses of the Bangweulu block. To the northwest the Irumide belt structures appear to termi-

nate in the Ubendian belt, which was re-activated during the Irumide orogenesis (*ca*. 1100 Ma). The latter is considered to have accommodated crustal shortening across the Irumide belt through large-scale strike-slip faults (Daly, 1986a,b). In the southwest, the presumably younger Zambezi belt transects Irumide belt structures but they reappear further south in the Choma-Kalomo block which is taken to be the lateral continuation of the Irumide belt (Hanson *et al.*, 1988b). In the west, Irumide metasediments form the cover to crystalline rocks of the Bangweulu Block and basement upon which the younger Katangan sedimentary rocks were deposited. The eastern boundary of the Irumide belt is not well defined due to strong