Extensional and Compressional Magmatism in the Mesoproterozoic Irumide Belt of Zambia: A Record of Rifting, Continental Rupture and Collision

F. Tembo and B. De Waele

Geology Dept., University of Zambia, P.O. Box 32379, Lusaka, Zambia, E-mail: ftembo@mines.unza.zm

The Mesoproterozoic geological history of Zambia is preserved in several geological terrains, the most significant being the Irumide belt a 1,000 km long, NE-SW trending region of crystalline metamorphic and metasedimentary rocks, covering the eastern part of Zambia.

The stratigraphic and structural history of the Irumide belt indicates that it has gone through an orogenic cycle involving rifting, sedimentation and collision. The rifting phase is preserved in the northern segment of the belt, which consists of continental and shallow marine sedimentary rocks deposited in structurally controlled basins.

Sedimentation was accompanied by localised bimodal volcanism represented by thin felsic tuff beds and basalt flows interbedded within the pelitic units. In its central part, the Irumide belt consists of a weakly metamorphosed cyclic sequence of arenites and pelites. The arenite-pelite sequence continues and increases in thickness southeastward, where it is associated with minor carbonates and a thick sequence of mafic volcanics.

The collision and relaxation phase of the Irumide orogeny was accompanied by profuse granitoid magmatism, which on the basis of field relationships is represented by three 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. Major and trace element data on the granites confirm the different nature and geotectonic setting of the three granite suites. All the granites have a peraluminous character. The granites have relatively flat heavy REE and moderate to steep light REE patterns. Tectonic discrimination on the basis of trace element patterns, indicates that the older suite of leucocratic granites represents syn-collisional magmatism, whilst the two younger suites of biotite granite were emplaced in a within plate setting.