Characterisation of syn- and post-collisional granite magmatism, and metavolcanics in the Irumide belt, Zambia.

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This paper presents both new geochronological and geochemical data obtained on granites and metavolcanics in the Irumide belt, and sheds light on the evolution of this important orogenic belt.
The Irumide belt is underlain by a granitic "basement" complex of calc-alkaline characteristics, represented in the southwest by the Mkushi Gneiss Basement Complex (MGBC), and in the northeast by the granites of the Bangweulu Block. This "Basement" is of Palaeoproterozoic age and has been dated at 2049 ± 6 Ma for the Mkushi Gneiss (Robb, pers.comm.) and 1868 ± 20 Ma for the Mambwe Granodiorite in the Bangweulu Block (Cahen et al., 1984).
Possible evidence of initial rifting can be found in the Mpika area, where Mosley and Marten (1979) describe a suite of bi-modal metavolcanics in the Ibangwe Group.
The Irumide basin is characterised by proximal, shallow sedimentation, dominated by pure quartzites alternating with pelites, which now form the Muva Supergroup. Some intercalations of acid volcanics in the northeast, preliminarily SHRIMP dated at 1880 Ma (Wingate, Pers.comm..), could well represent deposition of volcanic arc material from the Bangweulu Block, rather than reflect a regional phase of extension as suggested by Daly (1986). The age limit for the opening grossly coincides with earlier views of Daly and Unrug (1982), who place it after the Eburnian Orogeny at 1820 Ma. Sedimentation continued until the onset of the Irumide Orogeny, taken around 1355 Ma (Snelling et al., 1986), in a subsiding basin, explaining both the vast thickness of up to 10,000m, reported by Daly (1986) as the rather uniform sedimentary characteristics observed throughout the belt.
The Muva sediments were intruded by pre- to syn-collisional granites (ca. 1400 Ma.), accompanied by intrusive mafic bodies. The granites show high $^{87}Sr/^{86}Sr$ ratios, which suggest a large crustal source component (Daly, 1986). Melting of the lower crust is suggested to have been achieved through intrusion of basic magma into the crust during the extensional dynamics (Daly, 1986).
Possible remnant oceanic crust has only been described in the southwest of the belt (Tembo et al., 1999), and in the Chewore inlier (North Zimbabwe) dated at 1393 ± 22 Ma (Goscombe et al. 1998; Oliver et al., 1998). Both have been described as ophiolitic sequences (Tembo et al. 1999; Johnson, 1999). This suggests that the Irumide basin was asymmetrical in nature, and opened up more extensively towards the southwest.
Late- to post-tectonic granite magmatism, shows high $^{87}Sr/^{86}Sr$ initial ratio's and relatively low Nb, Hf, Ti and Zr content, indicating a source involving a large crustal component. Strongly negative Eu anomalies indicate that fractional crystallisation of plagioclase forms an important part of their development. These younger granites were formed through melting of deeper crustal levels due to crustal thickening associated with the Irumide contractional tectonics. Geochemistry places these granites in a Within Plate Setting.

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