

# Geology and correlation of the central Irumide belt

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## Abstract

The Irumide Fold belt of Zambia consists of a Palaeo to Mesoproterozoic complex of gneisses and granite gneisses and a supracrustal sequence of quartzites and pelites. Although no direct correlation is possible, the metasedimentary sequence is tentatively equated with the Manshya River Group described in the NE. The basement to the Irumide belt consists of the Bangweulu Granites to the North, and the Mkushi gneiss basement (MGB) to the Southwest. Age constraints on the Bangweulu Block are limited, but the Mkushi Gneiss has been dated at ~2050 Ma. A detrital provenance study on a quartzite of the Manshya River Group near Mkushi indicates derivation from terranes of up to 3180 Ma, with a maximum age for the Manshya River Group set by the youngest detrital grain at 1941 Ma. Detrital cores from paragneisses and migmatites in the Serenje area indicate a more uniform detrital source for the sedimentary protolith of 2050–2000 Ma. A more direct age constraint on the Manshya River Group has been provided through an age of 1880 Ma on a concordant rhyolite in the metasedimentary sequence near Chinsali. The Manshya River Group consists of a succession of four pelite and four quartzite Formations. The granitoids, which make up a large portion of the Irumide belt, can be subdivided into an older suite of leucocratic gneisses and biotite-granites, and a younger suite of alkaline, often porphyritic K-feldspar granites. Oversimplified lithostratigraphic division of the “crystalline basement” in the southwest of the Irumide belt has led to an overestimation of the Palaeoproterozoic basement (MGB). The extent of the Palaeoproterozoic basement awaits re-evaluation through fieldwork.

The main structural trend of the Irumide belt is northeast and is related to extensive crustal shortening during the main stage of the Irumide orogeny. Tectonic transport is directed towards the northwest, with southwest directed backthrusting locally developed to define a double verging overall structure. The compressional stage is characterised by amphibolite grade metamorphism and accompanied by widespread granite magmatism and anatexis.

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## 1. Introduction

The northeast–southwest trending Irumide belt is a Mesoproterozoic and/or Palaeoproterozoic terrane occupying most of central-eastern Zambia. The Pan-African Zambezi belt to the southwest separates the Irumide belt from the broadly coeval Choma–Kalomo Block. The Lufilian belt to the west overprints the Irumide structures, such that the nature of the Irumide basin below the Lufilian belt is not well known. To the northeast the Irumide belt is bound by the Palaeoproterozoic Ubendian belt, which was reactivated during the Meso and Neoproterozoic. The polycyclic Mozambique belt occurs to the east and southeast while to the

north the Palaeoproterozoic rocks of the Bangweulu Block occur (Fig. 1).

The Irumide Belt was first described by Ackermann (1950) and Ackermann and Forster (1960) to consist of an older granitic complex (Die Mkushi Gneisse) and a younger metasedimentary sequence called the Muva Supergroup. Successive mapping by geologists of the Zambian Geological Survey Department from the early 1960s to 1994, referenced herein, has shed more light on the geology of the Irumide belt (Fig. 2; Stillman, 1965; Smith, 1966; Moore, 1967; Cordiner, 1968, 1977; Cvetkovic, 1972; Page, 1973; Daly, 1986; Harding, 1993; Kerr, 1993; Klinck, 1993; Mosley, 1993; Mosley and Marten, 1994; Mapani and Moore, 1995; Van De Velde and De Waele, 1997; Smith and Kerr, 2000).

The northern and northwestern part of the Irumide belt consists of unmetamorphosed clastic sedimentary

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