U-Pb sensitive high-resolution ion microprobe (SHRIMP) zircon geochronology of granitoid rocks in eastern Zambia: Terrane subdivision of the Mesoproterozoic Southern Irumide Belt

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[1] The Southern Irumide Belt (SIB) is a structurally and metamorphically complex region of mainly Mesoproterozoic igneous rocks in southern and eastern Zambia, northern Mozambique and northern Malawi that was strongly overprinted in the Neoproterozoic to Cambrian Damara-Lufilian-Zambezi (DLZ) orogeny. Because of the scarcity of geological data from this region, little is known about the timing of tectonomagmatic events; however, this belt has traditionally been considered to be a southerly continuation of the adjacent Irumide Belt (IB). Here we provide 27 new U-Pb sensitive high-resolution ion microprobe (SHRIMP) zircon ages that constrain the Paleoproterozoic to Cambrian tectonomagmatic history of this belt and which, for the first time, allow for direct comparison with the adjoining IB. The SIB is floored by a predominantly late Paleoproterozoic basement, which was intruded by voluminous continental margin arc-related magmas between 1.09 and 1.04 Ga and accompanied by high-temperature/low-pressure metamorphism. In contrast, the IB is floored by a late Paleoproterozoic basement that is generally older than 2.0 Ga, contains significant mid-Mesoproterozoic plutonic rocks that are not present within the SIB, and underwent moderate-pressure/moderate-temperature compressional metamorphism and S-type granitoid magmatism at circa 1.02 Ga. These data indicate that the crust underlying the SIB is not a continuation of that underlying the IB but represents an allocthonous continental margin arc terrane juxtaposed against the Congo-Tanzania-Bangweulu Craton during the late Mesoproterozoic Irumide orogeny. Reworking and shearing of the SIB occurred during the DLZ orogen, resulting in the present-day architecture as a series of stacked terranes which have been exploited by voluminous posttectonic granitoid batholiths. **Citation:** Johnson, S. P., B. De Waele, and K. A. Liyungu (2006), U-Pb sensitive high-resolution ion microprobe (SHRIMP) zircon geochronology of granitoid rocks in eastern Zambia: Terrane subdivision of the Mesoproterozoic Southern Irumide Belt, *Tectonics*, *25*, TC6004, doi:10.1029/2006TC001977.

1. Introduction

[2] The Irumide Belt and Southern Irumide Belt of Zambia comprise a series of Mesoproterozoic structural terranes of high-grade gneisses and supracrustal units along the southern margin of the central African Congo-Tanzania-Bangweulu Craton (hereafter the CTB Craton), but specifically, the Paleoproterozoic Bangweulu Block (Figure 1a). The presence of Permo-Triassic "Karoo" graben between these two tectonic provinces precludes direct correlations between them, and it is entirely possible that these younger rifts conceal an important suture along this margin of the CTB Craton (Figure 1). To the east and west, Neoproterozoic tectonism of the East African and Damara-Lufilian-Zambezi (DLZ) orogens respectively (Figure 1a), have thoroughly affected the region, largely obliterating any pre-Pan African fabrics and this deformation was followed by the intrusion of numerous late Neoproterozoic-Cambrian igneous complexes [*Drysdall et al.*, 1972; *Haslam et al.*, 1986; *Johns et al.*, 1989].

[3] The Irumide Belt (IB) is a NE-SW trending belt composed of Paleoproterozoic to Meosproterozoic rocks. The mid-Paleoproterozoic granitoid basement known as the Bangweulu Block [*Anderson and Unrug*, 1984] is overlain by a thick sequence of late Paleoproterozoic supracrustal and volcanic units termed the Muva Supergroup [*Daly and Unrug*, 1982]. During both the middle and late Mesoproterozoic these basement units were intruded by a series of S-type granitoids [*De Waele et al.*, 2006] and during the late Mesoproterozoic event, magmatism was accompanied by compressional tectonometamorphism, i.e., the Irumide orogeny [*De Waele*, 2005]. Throughout the entire Paleoproterozoic and Mesoproterozoic, it is evident that this margin of the CTB Craton, i.e., the IB and Bangweulu Block, was never an active margin [*De Waele et al.*, 2006].

[4] The Southern Irumide Belt (SIB) is a relatively new term introduced by *Johnson et al.* [2005] to describe a wide variety of variably metamorphosed igneous and metasedimentary lithologies which are distinct from the monotonous

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