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THE GEOCHRONOLOGICAL FRAMEWORK OF THE IRUMIDE BELT: A PROLONGED CRUSTAL HISTORY ALONG THE MARGIN OF THE BANGWEULU CRATON

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ABSTRACT. Ion microprobe U-Th-Pb analyses of zircon from 40 granitoid rocks collected from the late Mesoproterozoic Irumide Belt in Central Southern Africa, along the southern margin of the Archean to Paleoproterozoic Bangweulu Block, provide a comprehensive set of age data for this complex orogen. The data indicate that the Irumide Belt is constructed on a basement of principally Paleoproterozoic (ca. 2.05–1.93 Ga) age with a subordinate Neoarchean (ca. 2.73 Ga) component, which is overlain by a platformal quartzite-pelite succession known as the Muva Supergroup. Previously published U-Pb detrital zircon data for the Paleoproterozoic Muva Supergroup, which show age populations that match all of the pre-1.9 Ga basement components identified within the Irumide Belt, suggest that the pre-Muva basement was assembled as a coherent block by ~1.8 Ga, which we refer to as the Bangweulu Craton. The southern margin of the Bangweulu Craton was then intruded by a previously unrecognized suite of biotite-bearing granitoid rocks between 1.66 and 1.55 Ga, not recorded elsewhere in the region, and was later the site of emplacement of voluminous granitoid magmatism during the Irumide Orogeny at between 1.05 and 1.00 Ga. Hf isotopic data from zircon in these suites indicate variable influence from cryptic Archean rocks in the lower crustal melting zone of the Bangweulu Block. U-Pb analyses of inherited zircon cores in magmatic zircon in these granitoid rocks, directly confirm the presence of this reworked cryptic Archean basement of the Bangweulu Craton. The age data confirm previously proposed tectonic models for the Mesoproterozoic evolution of central Africa, refuting the presence of a continent-spanning Grenvillian-aged Orogen, including the Kibaran Belt, Irumide Belt and Choma-Kalomo Block of central Africa and connecting with Mesoproterozoic terranes further south along the margins of the Kalahari Craton. The data clearly show that the Proterozoic tectonic evolution of the Bangweulu Craton, which became attached to the southern margin of the larger Congo Craton during the Mesoproterozoic, involved a series of distinct convergent orogenic episodes affecting and reworking its southern (passive) margin. The mismatch in timing of Mesoproterozoic orogenic activity along the Bangweulu Craton, compared to that on the margins of the Kalahari, is compatible with the notion that these continental fragments were not juxtaposed along these Mesoproterozoic belts and in their present-day relative positions at the time. Whether either of these central and southern African cratons did form part of Rodinia, however, remains a matter for debate.

INTRODUCTION

The Irumide Belt is an east-northeast-trending orogenic belt situated on the southern margin of the Bangweulu Block, part of the Congo Craton. It is composed of Paleoproterozoic basement and supracrustal units intruded by various granitoid suites. To the southwest, lithologies of the Irumide Belt are structurally overlain by Neopro-

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