Does the record of punctuated magmatism and late Mesoproterozoic tectonism along the southern margin of the Congo Craton support a continent-spanning "Kibaran" event during the formation of Rodinia?

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The Irumide Belt of Zambia represents a Mesoproterozoic active margin along the southern edge of the Congo Craton, along which a record of convergent processes, which could possibly relate to the participation of the Congo Craton in the Rodinia Supercontinent, may have been retained. Unfortunately, the exact nature of this margin and the timing, character and extent of Mesoproterozoic tectonism in the Irumide Belt have long remained enigmatic, hampering any serious attempts at fitting the southern Congo margin against similarly aged convergent margins of other continental blocks. As a result, opinion is widely divided as to whether the Congo Craton did or did not take part in the formation of the Rodinia Supercontinent between 1300 and 800 Ma.

Zircon U-Pb SHRIMP geochronology has revealed that an Archaean to Palaeoproterozoic basement complex (~2.73 Ga and 2.05-1.93 Ga) occurs in the Irumide Belt, which is overlain by a metasedimentary succession, the Muva Supergroup, to which dated lava's, detrital zircon age data and the age of the oldest granitoids intruding the sequence assign a Palaeoproterozoic age (1.88-1.66 Ga). The basement and overlying succession were intruded by small plutons between 1.66-1.55 Ga, during a magmatic event, seemingly unaccompanied by regional metamorphism. The entire region was extensively deformed during the Irumide event, temporally constrained through U-Pb SHRIMP ages of low Th/U zircon rims at between 1020 and 1018 Ma. Irumide tectonism affected basement and cover sequences alike, and was accompanied by large scale intrusion of granitoids with crust-dominated geochemistry between 1.05 and 1.00 Ga. Thermobarometric data from metapelitic rocks and migmatites in the Irumide Belt suggest that metamorphism occurred under peak P-T conditions at up to 8.0 kbar and 815°C, with a partial retrograde path indicating decompression down to 4.5 kbar and cooling to 600°C. The partial P-T path indicates a minimum exhumation of ~12 km after peak metamorphism, strongly suggesting crustal thickening during Irumide tectonism, a fact corroborated by previous estimates of 57% shortening across the belt (Daly, 1986). Crustal thickening and subsequent exhumation occur in both accretionary setting, such as the present day Andean arc, or in continent-continent collisional setting, such as the present day Himalaya.

The new geochronological constraints on the Irumide Belt reveal significant differences with adjacent Mesoproterozoic terranes not previously recognised, either due to incomplete or to imprecise datasets. Previously held views, correlating the Choma-Kalomo Block, which is situated along strike but across the Neoproterozoic Zambezi Belt, with the Irumide Belt, need to be reconsidered, as new data for both the Choma-Kalomo Block (Bulambo et al., 2004) and for the Irumide Belt (De Waele, 2005; De Waele et al., 2003) show that there is no precise match between their magmatic record. Similarly, previous correlations between the Irumide and Kibaran belts cannot be maintained based on new data (De Waele, 2005; De Waele et al., 2003; Tack et al., 2002; Tack et al., in prep).

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