

Terrane Subdivision of the Irumide Orogen in Zambia: a Testable Tectonic Hypothesis

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We propose a testable subdivision of the Mesoproterozoic Irumide belt in eastern Zambia into several thrust-bound, stacked tectonometamorphic terranes that we infer were imbricated during the Irumide orogeny (~1.05-1.0 Ga). Parautochthonous *Serenje terrane*, at the base of the stack, consists of basement gneisses, migmatites and granites of Archean or Paleoproterozoic age, overlain by conglomerate, quartzite and pelite of the late Paleoproterozoic Muva Supergroup. The supracrustal rocks are polydeformed into upright structures and variably metamorphosed from greenschist facies near the Irumide Front to uppermost amphibolite facies farther to the southeast, where the sub-assembly *Sil-Kfs-Crd-L* is stable. Farther southeast, *Luangwa terrane* consists of polydeformed mid-amphibolite facies Ms-rich quartzite, *Grt-Sil-St* schist, minor carbonate and layered metavolcanic units that display prominent recumbent folds. Cox et al. (2002) found ages of 2.6 Ga within the Luangwa terrane. The high grade gneisses in Serenje and Luangwa terranes are locally overlain by a package of greenschist-facies rocks, including mafic metavolcanics, *Qtz-Ms-Chl* schist, quartzite and conglomerate that characterise the Rufunsa sequence, but the contact between the low grade Rufunsa sequence and the high grade Serenje and Luangwa terranes has not been observed. *Nyimba terrane*, overlying Luangwa terrane to the southeast, is largely composed of marble and *Di±Tr*-bearing calc-silicate, with the mutual boundary between the terranes being the site of subhorizontal, SE-trending, amphibolite-facies stretching lineations and tectonic mélange and inferred to be a ductile thrust. Nyimba terrane is tectonically overlain by *Petauke-Sinda terrane*, which is predominantly composed of a calc-alkaline suite of gabbroic, dioritic, tonalitic and granitic plutons that carry enclaves of mafic rocks with a MORB-like signature, together with subordinate supracrustal rocks including graphitic gneiss and pelite with the sub-assembly *Sil-Crd*. Grade of metamorphism is uppermost amphibolite to granulite facies. *Chipata terrane*, southeast of Petauke-Sinda terrane, is dominated by low pressure retrogressed mafic and felsic granulites of supracrustal origin. Available U/Pb data indicate that granitoid magmatism and regional metamorphism in all five terranes took place between ~1.05-1.0 Ga, which we relate to the Irumide orogeny. However terrane accretion started in the Late Archean and continued till the Neoproterozoic.

We infer that the supracrustal rocks of Serenje, Luangwa and Nyimba terranes formed on the platform and margin of the Paleoproterozoic Congo-Tanzania-Bangweulu (CTB) craton, and that the rocks of Petauke-Sinda terrane represent a Mesoproterozoic arc that either developed on the margin of that craton, or was accreted to it during the Irumide orogeny. We infer that Chipata terrane, situated outboard and structurally on top of the arc, is part of another craton, and thus that the boundary between Chipata and Petauke-Sinda terranes is a suture. The Rufunsa sequence is interpreted to be continental in origin and to have developed on the CTB craton, but its relation to the other terranes of the CTB craton remains unconstrained.

References

- Cox, R.A., Rivers, T., Mapani, B.S., Tembo, F., and DeWaele, B. 2002. 3rd International Field Meeting for IGCP418/440, Abstracts. The Kibaran of Southwestern Africa/Super continent reconstruction for Rodinia. 27 July, 2002, Windhoek, Namibia.