MESOPROTEROZOIC SUPRA-SUBDUCTION MAGMATISM IN THE SOUTHERN IRUMIDE BELT, CENTRAL SOUTHERN AFRICA: IMPLICATIONS FOR THE CONGO CRATON IN RODINIA RECONSTRUCTIONS.

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The Irumide Belt is a terrain of deformed basement, supracrustals and late-Mesoproterozoic magmatic rocks that occur along the southern margin of the Congo Craton of central Africa. Because the belt was the locus of magmatism and convergent tectonics during the time-frame normally assigned to the assembly of the Rodinia supercontinent, it forms a critical feature, the understanding of which may help elucidate whether the Congo Craton participated in the amalgamation of the supercontinent, or not. The southeastward extension of the Irumide Belt into eastern Zambia, northeastern Zimbabwe and northwestern Mozambique, a region we term the "Southern Irumide Belt" (SIB), remains tenuous mainly because of a large exposure gap across the Mesozoic Luangwa graben and a lack of modern age data. In recent years, a few reliable data have become available for some key areas in the SIB. The Chewore Inliers of NE Zimbabwe, and Chongwe and Chakwenga regions of Zambia have recently been the focus of detailed and extensive geological investigations. These regions are characterised by a similar tectonostratigraphic sequences of felsic to mafic gneisses, abundant mafic amphibolites and metasomatic whiteschists.

The Chewore region is comprised of four tectonically stacked terranes; the Ophiolite Terrane (OT) comprising the 1.39 Ga old Chewore Ophiolite and the 1.08 Ga old Kaourera Arc; the South Zambezi Terrane (SZT), comprised of Kfs-megacrystic felsic to intermediate orthogneiss; the Granulite (GT), Quartzite (QT) and North Zambezi (NZT) Terranes are predominantly of meta-sedimentary origin but are intruded by a variety of felsic to intermediate orthogneisses, that in the GT and NZT have been dated at 1.07 and 1.08 Ga, respectively. Geochemisty of these orthogneisses, including those from the SZT, reveal that they formed in a supra-subduction zone setting. In the GT, QT and NZT high-temperature (>800˚C), low-pressure (<4.4 kbar) granulite facies metamorphism of the host sediments occurred contemporaneously with the intrusion of the orthogneisses.

The Chongwe and Chakwenga areas comprise Kfs-megacrystic felsic orthogneisses that are structurally overlain by folded and highly deformed mafic to felsic gneisses and whiteschists. Geochemical and whole rock isotopic (Sm-Nd) analyses of the various lithologies indicate formation in a supra-subduction setting comparable to that of the Kaourera Arc. Arc-magmatism occurred in a similar time frame to that in the Chewore Inliers, between 1.09 and 1.04 Ga. Imbrication tectonics, similar to that described for the Chewore Inliers, is apparent in the Chongwe and Chakwenga areas. The span in magmatic activity, covering some 50 M.yrs. suggests that both regions represent a succession of juvenile arcs that have been imbricated together during either Meso- or Neoproterozoic tectonism.

It is interesting to note that the age of magmatism in the SIB overlaps with the ages of the Mpande and Munali Hills granitic gneisses (1.09-1.04 Ga) that form the basement to the Neoproterozoic Katangan sediments of the Lufilian Belt, south of the Mwembeshi Shear Zone. Geochemistry of the Mpande and Munali gneisses also displays arc-like signatures, and it is possible that these gneisses also formed due to subduction processes and are part of the SIB, rather than part of the Congo Craton basement as is traditionally considered.

Our data suggest that at the time of Rodinia assembly, the SIB was dominated by 1.09-1.04 Ga supra-subduction oceanic-arc magmatism and thus the southern margin of the Congo Craton faced an open ocean. Mesoproterozoic metamorphism and deformation at 1.02 Ga in the Irumide Belt itself, and at 1.05 in the eastern parts of the SIB (i.e., around Chipata in eastern Zambia), may indicate oceanic arc formation outboard of the continental margin, followed by accretionary or collisional tectonics at ca. 1.05-1.02 Ga during amalgamation of Rodinia. However, it cannot be ruled out that the current configuration of stacked terranes is the result of Neoproterozoic tectonics, during the formation of Gondwana and that the SIB did not form part of the Mesoproterozoic margin of the Congo Craton at all.