

A new ca. 508 Ma sill province off the southern margin of the Kalahari Craton in Gondwana

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The Saldania Belt is composed of Ediacaran to Cambrian inliers preserved within the Permian Cape Belt. These inliers are mostly variably metamorphosed sedimentary rocks, into which a series of scattered mafic and felsic intrusions occur. The largest of these mafic intrusions is termed the Droogekraal Sill, with associated sills forming the Droogekraal Sill Province in this study. These mafic sills were sampled in the Gamtoos and Kango inliers of the Saldania Belt. These inliers are intruded by the ca. 520-480 Ma Cape Granite Suite and are unconformably overlain by the Table Mountain Group of the Cape Supergroup. The mafic sills were studied using U-Pb geochronology on zircon (together with Hf isotopic geochemistry) and apatite, as well as petrography and geochemistry. Petrography and geochemistry reveals that the Droogekraal Sill Province is basaltic and variably altered at greenschist to amphibolite facies. The main Droogekraal Sill was dated by U-Pb on zircon to ca. 508 Ma. Further U-Pb dates on apatite reveal similar ages, from the Droogekraal Sill and several other associated sills, indicating the thermal history is similar in age to magmatism and metamorphism within the Saldania Belt. The results provide the first U-Pb zircon date of the Droogekraal Sill, and furthermore invalidate erroneous older Ar-Ar ages (Le Roux, 1983). The U-Pb age confirms that the field evidence that the Droogekraal Sill post-dates the Potgieterspoort Fault, which it cuts across, but also predates deposition of the Cape Supergroup above the fault and with which it is in direct contact, but lacks any thermal aureole. The new age determination shows that both mafic and felsic magmatism was diagnostic of the Ediacaran to Cambrian in the Saldania Belt. Additionally, the new ca. 508 Ma Droogekraal Sill Province invites comparison using the magmatic barcode record with the Kalkarindji LIP/Pinghe SLIP of North Australia.

References:

- Le Roux, J.P., 1983. Structural evolution of the Kango Group.. Special Publication of the Geological Society of South Africa 12, 47-56.