

Cannibalisation of Palaeoproterozoic arc terranes during the Mesoproterozoic in the Namaqua Metamorphic Belt, southern Africa

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During crustal convergence associated with supercontinent assembly, magma generation in the thickened continental crust gives rise to voluminous granites and related rock suites. These suites are important in resolving the tectonic evolution of these terranes as they give a detailed timeline for formation and collapse of the orogeny as well as the nature of the lower crust and mantle in the region. Recent field mapping, geochemistry and geochronology has clarified the nature and significance of the Eendorn (granodiorites to alkali feldspar granites) and Kum Kum (norites to gabbro-norites) suites in the Namaqua Metamorphic Belt of southern Namibia and northern South Africa. The Eendorn rocks have intrusive ages of between 1230 and 1190 Ma, while the gabbroic rocks have intrusive ages of ~1212 Ma, synchronous with early granitic magmatism. The two suites appear to have very similar contaminated ϵNd values of around -4 to -8, while the initial Sr isotope ratios for the Kum Kum Suite rocks (0.7055 – 0.7087) fall within the range of those calculated for the Eendorn Suite rocks (0.6993 – 0.7214). Comparison with Nd initial values suggests that while all the Kum Kum Suite rocks are sourced from the same parent, the Eendorn Suite rocks have at least two parental sources: Type 1 with low initial Sr and high initial Nd and Type 2 with higher initial Sr and lower initial Nd. The Kum Kum Suite rocks are likely to have been sourced from the same parent material as Type 2 Eendorn rocks. Zircon geochronology and model age calculations suggests that Type 1 Eendorn is derived from partial cannibalisation of the Palaeoproterozoic Richtersveld magmatic arc and occurs in the Kakamas domain. Type 2 Eendorn and Kum Kum Suite rocks are derived from an older arc terrane with an age of ~2.2Ga or older, that was completely cannibalised during Mesoproterozoic crustal recycling linked to thrust imbrication of the Kakamas domain over the Richtersveld magmatic arc at 1210Ma.