THE MESOPROTEROZOIC E. ANTARCTIC - SE. KALAHARI CRATON OROGENY

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A contiguous ~ 4000 km section of ~Grenville-aged rocks exposed in parts of southern Gondwana formed during the orogeny related to Rodinian amalgamation. The rocks, subsequently dispersed by Gondwana breakup, are represented by the Namaqua-Natal Metamorphic Province, S. Africa; Cape Meredith Complex of W. Falkland; Haag Nunatacks, W. Antarctica; Maud Province of Dronning Maud Land, E. Antarctica and the Mozambique Belt in SE Africa.

Isotope studies show the major crust-forming and tectonothermal events in these areas are Mesoproterozoic (1.2 to 1.0 Ga), with major juvenile crustal addition. Possible mixing between juvenile magmas and older cratonic crust is locally recognised. Lithologies formed during Rodinian amalgamation in the orogenic belt include arc-related granitoids, quartzofeldspathic, metapelitic and metacarbonate paragneisses, small mafic to ultramafic intrusions and A-type granitoid plutons. A-type granite intrusion between ~1030 & 1100Ma is related to areas underlain by juvenile crust. Synchronous crustal addition to the Kalahari Craton includes mafic sills and volcanics and shallow water clastic and, locally, chemical sediments.

Early structures include recumbent folds and thrust faults verging cratonward with the Kalahari Craton forming an indentor onto which the arc-complexes accreted. Later transpressional shear zones related to indentation of the Kalahari Craton facilitated the intrusion of the A-type plutons. The first metamorphic event was associated with collisional accretion of arc complexes with isothermal decompression clockwise P-T-paths seen in HP granulites in exhumed hanging wall settings. In other settings, anti-clockwise P-T paths are related to footwall compression/burial. Orogenic termination is related to transpressional intrusion of the A-type granitoid plutons which caused high heat input after which isobaric cooling paths followed.