Paper Number: 4181

Tectono-thermal reworking of the SE Archean Kaapvaal Craton during Gondwana assembly: Evidence from Dronning Maud Land, Antarctica

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The Archean Grunehogna Craton of Western Dronning Maud Land (WDML), East Antarctica represents a crustal fragment of the SE Kaapvaal Craton of South Africa, detached during Gondwana breakup [1], and collectively referred to as the Kaapvaal–Grunehogna Craton (KGC). Traditionally, WDML was considered to consist of two parts separated by the Pencksökket–Jutulstraumen crustal discontinuity (PJD): (1) the Archean Grunehogna Craton, and (2) an accreted juvenile oceanic island arc, namely the Proterozoic Maud Belt [2]. However, subsequent work based on Sm-Nd isotope data in the western Maud Belt [3] and detrital U-Pb zircon ages from the Grunehogna Craton [4], supports the concept of inboard subduction and formation of the Maud Belt as a continental arc on the Archean KGC craton margin. In addition, high-grade metamorphism of T ~700 ± 30°C and P ~9–10 kbar in the westernmost Maud Belt (western H.U. Sverdrupfella) was recently shown to be Pan-African in age [5], contrary to previous studies that argued for only late Mesoproterozoic metamorphism [2]. This recent work has led to re-interpreting the Pencksökket–Jutulstraumen crustal discontinuity as a major Pan-African thrust that formed during Gondwana assembly [5], rather than a late Mesoproterozoic boundary between a juvenile Maud Belt and the Archean KGC margin, as previously proposed [2]. Metamorphic constraints, U-Pb titanite and zircon age data and isotope geochemistry across the PJD collectively indicate that: (a) the Mesoproterozoic Maud Belt initially formed as a continental arc on the Archean KGC craton margin and experienced granulite facies metamorphism related to Rodinia, and (b) the south-easternmost Archean KGC craton margin including the Maud Belt continental arc experienced major Pan-African crustal reworking as a result of high-grade polyphase metamorphism during the suturing of East and West Gondwana.

References:

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