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In situ U-Pb-Hf isotope analyses of the ultra-high temperature metapelite from Mather Peninsula, east Antarctica.

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U-Pb zircon geochronology from an ultra-high temperature (UHT, ~1000 °C) granulite-facies metapelite from the Rauer Group, Mather Peninsula, east Antarctica, has yielded evidence for two episodes of metamorphic zircon growth, at ~1.00 Ga and ~530 Ma, and two episodes of magmatism in the source region for the protolith sediment, at ~2.53 and ~2.65 Ga, were identified from the zircon cores. Successive zircon growth at ~1.00 Ga and ~530 Ma records a sequence of distinct, widely spaced high-temperature metamorphic and/or anatectic events related to Grenvillian and Pan-African orogenesis. These metamorphic events in rock from Rauer Group can be correlated with events previously reported for the adjacent southern Prydz Bay and northern Prince Charles Mountains. These Archaean zircon cores have oscillatory growth zoning and possess ε_{Hf} values between -10 and +4, suggesting derivation of their precursor magmas from old crust and juvenile materials from mantle. The metamorphic domains have negative ε_{Hf} values, this means that Archean crust was remelted to generate these domains. The metamorphic effect on zircon Lu-Hf and U-Pb isotope systems in UHT metapelite will be evaluate. T_{Hf} DM ages from cores of zircon grains indicate the metapelite rocks share a ca.2.65-3.36 Ga source that is indistinguishable from that previously reported for parts of the Rauer Group. This study presents the robust geochronological evidence for the timing of UHT metamorphism of the Rauer Group, supporting arguments that the peak UHT metamorphic event occurred at ~1.0 Ga and was overprinted by a separate high-grade event at ~530 Ma.

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