

In situ U-Pb-Hf-O isotope analyses of the high grade metamorphic rocks from UHT terrane, Rauer Group, east Antarctica

WANG YANBIN

¹ Beijing SHRIMP Center, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China, wangyanbin@bjshrmp.cn

U-Pb zircon geochronology from an ultra-high temperature (UHT, ~1000 °C) granulite-facies paragneisses 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 Archean zircon cores have oscillatory growth zoning and possess ϵ_{Hf} values between -10 and +4 and $\delta^{18}\text{O}$ mostly between +2.62 and +5.64‰, 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-O and U-Pb isotope systems in UHT metapelite will be evaluate. $T_{\text{Hf DM}}$ 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 ~559-530 Ma.

The host orthogneiss surrounding the UHT paragneisses at Mather Peninsula is Archean in protolith age (3.3-3.6 Ga). The host orthogneiss zircons also yield 541-515 Ma overgrowths ages. The age means that the orthogneiss cannot be a heat source for UHT metamorphism.

This work was supported by funds from the Natural Science Foundation of China (Nos. 401073014, 41373052, 41773049) and National Antarctic Program (CHINARE2014-02-05-5, IC201707). Logistical and financial support by the Arctic and Antarctic Administration of China.