

The timing and duration of HT-UHT metamorphism constrained by zircon U-Pb-Hf and trace element signatures

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We investigate a suite of high-grade rocks from the Khondalite Belt of the North China Craton, using zircon U-Pb geochronology, and trace element and Hf isotopic signatures to track zircon behavior and constrain the timing and duration of metamorphism. Heavy rare-earth element (HREE) features from zircon in garnetiferous leucogneiss best record zircon behavior. Our results indicate zircon growth/recrystallization during prograde metamorphism at 1.92-1.90 Ga, protracted zircon growth/recrystallization during a retrograde cooling stage at 1.87-1.82 Ga, and zircon growth during local garnet breakdown at ca. 1.84 Ga. The virtual absence of zircon in the time gap between 1.90 and 1.87 Ga likely constrains the timing of thermal peak at Dongpo locality in Daqingshan Terrane. This work indicates that the long-lived post-peak cooling stage at 1.87-1.82 Ga with ca. 50 myr. is more conspicuous in this part of the Khondalite Belt than the others. This probably reflects regional differences in cooling and exhumation rate during Nuna/Columbia amalgamation.