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Application of the two-feldspar geothermometer to ultrahigh-temperature (UHT) rocks in the Khondalite belt, North China craton and its implications

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Abstract

The Paleoproterozoic Khondalite belt in the North China craton preserves evidence for ultrahigh-temperature (UHT) crustal metamorphism associated with the collision of the Yinshan and Ordos Blocks. Here we apply two-feldspar geothermometry to UHT granulites from two localities newly reported in this study (Tuguishan and Xuwujia) and another two localities from previous studies (Dajing/Tuguiwula and Dongpo) in the Khondalite belt. The presence of abundant perthite/mesoperthite in these rocks reflects post-peak slow cooling. The minimum estimated peak metamorphic temperatures are 832–998, 819–952, 844–1037, and 966–1019 °C computed at 8 kbar for the Dajing/Tuguiwula, Dongpo, Tuguishan, and Xuwujia areas, respectively. These results confirm the previous report of extreme metamorphism at Dajing/Tuguiwula and Dongpo, and reveal similar conditions in the new localities reported here, suggesting that UHT metamorphism is widespread in the Khondalite belt of the North China craton. Our study demonstrates that UHT metamorphism can be recognized using the two-feldspar geothermometry in rocks that do not possess other key UHT assemblages.

Keywords: Ultrahigh-temperature (UHT) metamorphism, two-feldspar geothermometer, perthite/mesoperthite, Paleoproterozoic, Khondalite belt, North China craton