

## Metamorphic *P–T* evolution and U–Pb dating of the garnet- cordierite-sillimanite metapelitic rocks from the Wulashan- Daqingshan Complex, Khondalite Belt, North China Craton

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The Wulashan-Daqingshan Complex in the central segment of the Khondalite Belt, the North China Craton yields anatectic garnet-cordierite-sillimanite metapelitic rocks with representative metamorphic assemblages and microtextures. Combined with petrographic observation and *P–T* pseudosections, a clockwise *P–T* path involving periods of pre-peak, peak, post-peak near-isothermal decompression and decompressional cooling is therefore inferred. In the pre-peak field of garnet + biotite + K-feldspar + plagioclase + sillimanite + quartz + magnetite + liquid, garnet is produced by consuming biotite, quartz, and plagioclase during biotite dehydration melting. The peak assemblage is garnet + biotite + K-feldspar + plagioclase + sillimanite + quartz + ilmenite + magnetite + liquid with *P–T* conditions of 830–860 °C and 9.5–11 kbar. The following near-isothermal decompression assemblage is garnet + biotite + cordierite + K-feldspar + plagioclase + quartz + magnetite + ilmenite + liquid at 840–880 °C and 6.0–7.5 kbar, characterized by matrix cordierite isolated from garnet via biotite decompressional dehydration melting reaction of  $Bt + Sil + Qz \pm Pl \rightarrow Crd + Kfs \pm Ilm + Melt$ . Subsequent decompressional cooling processes resulted in cordierite and biotite + plagioclase symplectites surrounding garnet due to the following reactions of  $Grt + Sil + Melt \rightarrow Crd + Bt + Fe\text{-oxide}$  and  $Grt + Melt \rightarrow Bt + Qz \pm Pl$ . LA-ICP-MS U–Pb analyses on detrital zircons yield three age populations of 2400 ~ 2500 Ma, ~2300 Ma and 2000 ~ 2100 Ma, suggesting that the sedimentary protoliths of the studied rocks deposited at some time after ~2000 Ma. Moreover, results of LA-ICP-MS U–Pb dating for the metamorphic zircons range in 1850 ~ 1950 Ma with two age groups of ~1950 Ma and ~1860 Ma. The clockwise *P–T* path and new zircon data reveal that the Khondalite Belt involved in continent–continent subduction and collision followed by exhumation and cooling between the Yinshan and Ordos Blocks in the Western Block of the North China Craton, and experienced the Paleoproterozoic granulite-facies metamorphism.