P-T-t-D path constraints of the Barrovian-type metamorphic series in the Khondalite belt of the North China Craton

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A sequence of Barrovian metamorphic series rocks from the chlorite zone to the kyanite zone outcrops in the eastern part of Daqingshan terrane, North China Craton. An integrated study of geological mapping, kinematic analysis, petrography, phase equilibria modeling and zircon U-Pb dating is used to constrain the P-T-t-D path of the Barrovian metamorphic series. Based on the petrology and mineral chemistry, minerals are divided into prograde, peak and retrograde metamorphic stages. Pseudosections are calculated using THERMOCALC for three samples from garnet, staurolite, kyanite zones, and the peak metamorphic conditions are confined to be 585 ℃ and 0.59 GPa, 590 ℃ and 0.60 GPa, 645 ℃ and 0.71 GPa, respectively. The P-T paths of the Barrovian metamorphic rocks recorded a crustal over-thickening during prograde stage, and isobaric heating after reaching P_{max}. A top – to – southeast ductile shearing deformation was happened right after the rocks reaching P_{max} based on kinematic analysis. Zircons from metapelites, metavolcanic rocks and an undeformed granite are dated. According to the results, the metamorphism is estimated to start from 1890 Ma, and end before 1870 Ma. In combined with geochemistry study of metavolcanic rocks (Peng et al., 2011) and HT-UHT metamorphism study (Guo et al., 2012; Jiao et al., 2015), the Daqingshan terrane might experience a subduction – collision – extension tectonic process at the PaleoProterozoic.

Peng et al. (2011). *Precambrian Research*, **187**, 165-180.
Guo et al. (2012). *Precambrian Research*, **222-223**, 124-142.
Jiao et al. (2015). *Precambrian Research*, **269**, 31-57.