

EGU21-2

<https://doi.org/10.5194/egusphere-egu21-2>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Metamorphism and geochronology of garnet amphibolite from the Beishan Orogen, southern Central Asian Orogenic Belt: Constraints from P-T path and zircon U-Pb dating

Wenbin Kang and Wei Li

State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China

Numerous lenses of garnet amphibolite occur in the garnet-bearing biotite-plagioclase gneiss belt in the Baishan area of the Beishan Orogen, which connects the Tianshan Orogen to the west and the Mongolia-Xing'anling Orogen to the east. According to the microstructures, mineral relationships, and geothermobarometry, four stages of mineral assemblages have been identified as follows: (1) a pre-peak stage, which is recorded by the cores of garnet together with core-inclusions of plagioclase (Pl<sub>1</sub>); (2) a peak stage, which is recorded by the mantles of garnet together with mantle-inclusions of plagioclase (Pl<sub>2</sub>) + amphibole (Amp<sub>1</sub>) + Ilmenite (Ilm<sub>1</sub>) + biotite (Bt<sub>1</sub>), developed at temperature-pressure (P-T) conditions of 818.9–836.5 °C and 7.3–9.2 kbar; (3) a retrograde stage, which is recorded by garnet rims + plagioclase (Pl<sub>3</sub>) + amphibole (Amp<sub>2</sub>) + orthopyroxene (Opx<sub>1</sub>) + biotite (Bt<sub>2</sub>) + Ilmenite (Ilm<sub>2</sub>), developed at P-T conditions of 796.1–836.9 °C and 5.6–7.5 kbar; (4) a symplectitic stage, which is recorded by plagioclase (Pl<sub>4</sub>) + orthopyroxene (Opx<sub>2</sub>) + amphibole (Amp<sub>3</sub>) + biotite (Bt<sub>3</sub>) symplectites, developed at P-T conditions of 732 ± 59.6 °C and 6.1 ± 0.6 kbar. Moreover, the U-Pb dating of the Beishan garnet amphibolite indicates an age of 301.9 ± 4.7 Ma for the protolith and 281.4 ± 8.5 Ma for the peak metamorphic age. Therefore, the mineral assemblage, P-T conditions, and zircon U-Pb ages of the Beishan garnet amphibolite define a near-isothermal decompression of a clockwise P-T-t (Pressure-Temperature-time) path, indicating the presence of over thickened continental crust in the Huanishan arc until the Early Permian, then the southern Beishan area underwent a continental crust tectonic thinning process.