

EGU21-11000

<https://doi.org/10.5194/egusphere-egu21-11000>

EGU General Assembly 2021

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



## Petrography and phase equilibrium modeling of Paleoproterozoic metapelite in the Kuluktag area of Tarim Craton

**Yu Guo**

Northwest University, State Key Laboratory of Continental Dynamics, Department of Geology, Xi'an, China  
(guoyu\_0305@163.com)

The Kuruqtag area, located at the northeastern margin of the Tarim Craton, where the Precambrian metamorphic basement exposed, is ideal for studying the Precambrian geological evolution of the Tarim Craton. Previous zircon U-Pb chronology studies revealed that the metamorphic basement recorded a Paleoproterozoic tectonothermal event and suggested it associates with the Paleoproterozoic Nuna/Columbian supercontinent convergence event. However, the extensive range of metamorphic ages obtained from different studies (ranging from 1750-2000 Ma) and the lack of detailed P-T path corresponding to different metamorphic ages make it difficult to constrain the evolutionary framework of the Tarim craton during the Paleoproterozoic, which in turn affects future comparative regional studies.

To constrain the P-T path, in this study, we performed detailed petrography, mineral chemical, and phase equilibrium modeling of metapelite collected from the khondalite series in the western part of the Kuruqtag (a garnet-sillimanite-cordierite-biotite gneiss with metamorphic age ~1850 Ma) and obtained the following results.

Through petrographic studies, at least three phases of mineral assemblages can be used to invert the P-T path experienced by the metapelite. They are M1 (peak metamorphic stage): represented by fine-grained biotite remnant (Bi □) + fine-grained plagioclase (Pl □) and quartz + Ilmenite + , occurring as inclusions within the metamorphic garnet, and equilibrated mineral assemblages is: Grt(core) + Bi □ + Sill + Kfs + Pl □ + Qz + Ilm. M2 (isothermal depression stage), represented by cordierite occurring in the garnet rim or with spinel in the matrix, inferred equilibrated mineral assemblages is Grt(rim)+Bi □ +Cd+Kfs+Pl □+Ilm+Sp.M3 (isothermal depression stage), is marked by the appearance of new growth of biotite(Bi □□) and the conversion of Sill to And.

The P-T conditions for the mineral assemblage evolution (M1 -> M3) are constrained by a P-T pseudosection constructed in the Na<sub>2</sub>O -CaO-K<sub>2</sub>O-FeO-MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-H<sub>2</sub>O- TiO<sub>2</sub>-O<sub>2</sub> chemical system. The resulting P-T path is clockwise from the M1 stage (840°C, 4 Kbar) through the isothermal depression path to M2 (840-850°C, 5 Kbar) and then through the near-isobaric cooling path to the M3 stage (650°C, 3.5-4 Kbar).