

# Discovery of the Silurian high pressure pelitic gneiss in southern margin of middle Altyn and its tectonic geological significance

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**Abstract** The high pressure pelitic gneiss is first discovered in the Bashikuergan Group at the north part of Younusiay, which located at the southern margin of the middle Altyn Tagh. Four stages of mineral assemblage were identified by petrographic observation and mineral composition, which are Grt + Cpx + Ph + Pl + Bi + Q + Ru + Ilm, Grt + Ky + Ksp + Pl + Bi + Q + Ru + Ilm, Grt + Sill + Ksp + Pl + Bi + Q + Ru + Ilm and Grt + Sill + Ksp + Pl + Bi + Q + Ilm. And the metamorphic conditions of these four stages were constrained as  $P = 15.8 \sim 18.3\text{kbar}$ ,  $T = 646 \sim 729^\circ\text{C}$ ;  $P = 10.30 \sim 12.30\text{kbar}$ ,  $T = 781 \sim 821^\circ\text{C}$ ;  $P = 8.50 \sim 9.60\text{kbar}$ ,  $T = 812 \sim 838^\circ\text{C}$  and  $P = 4.65 \sim 5.70\text{kbar}$ ,  $T = 698 \sim 725^\circ\text{C}$  by equilibrium modeling according to the THERMOCALC 3.40, indicated a clockwise  $P$ - $T$  path. This character suggests a continental deep subduction-exhumation associated tectonic event. LA-ICP MS U-Pb dating yields the peak age of  $432.0 \pm 2.7\text{Ma}$ , the HP granulite-granulite facies age of  $401.4 \pm 2.5\text{Ma}$ , and the Amphibolite facies age of  $381.1 \pm 2.4\text{Ma}$ . The tectonic position of the high pressure pelitic gneiss exposed in the Bashikuergan Group at the southern margin of middle Altyn is obviously different from those HP-UHP rocks occurring in the Altyn Group in south Altyn. And peak metamorphic age ( $\sim 432\text{Ma}$ ) was also significantly different from the HP-UHP rocks in south Altyn Tagh ( $\sim 500\text{Ma}$ ). Therefore, the high pressure pelitic gneiss in this study should obviously not belong to the same metamorphic rocks belt with the south Altyn HP-UHP rocks. Combined with regional geological background and previous studies on peak metamorphic ages ( $\sim 430\text{Ma}$ ) of HP-UHP rocks with continental crust properties in the north margin of Qaidam basin, we preliminarily suggest that the high-pressure rocks may be the western extension of the HP-UHP metamorphic belt in the north margin of Qaidam basin, or a part of the HP-UHP rock blocks in the south margin of Qaidam basin, migrated by the complex multi-stage strike-slip fault system since Meso-Cenozoic.

**Key words** High pressure pelitic gneiss; Silurian metamorphic; P-T-t path; Southern margin of middle Altyn

