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Neoproterozoic magmatism and its tectonic significance in northern Altyn Tagh tectonic belt

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The northern Altyn Tagh tectonic belt, Hongliugou- Lapeiquan melange locates in the northern part of Tibet Plateau. It is famous as the Early Palaeozoic tectonic boundary indicated by the development of Early Palaeozoic ophiolite, and the evolution of structural superimposed by sinistral strike- slip Altyn Tagh Fault during Mesozoic and Cenozoic. Because of lack of the outcrop of Upper Proterozoic, the study almost focused on Archeozoic- Paleoproterozoic Era and Phanerozoic in northern Altyn area. As a result, the study on Neoproterozoic is nearly blank, which has confined to understand the regional tectonic process.

Recently, a series metamorphic intrusive mass, such as granitic gneisses, monzonitic granitic gneisses, granodioritic gneisses and gabbro diorite, have been disintegrated in Hongliugou- Lapeiquan Melange by 1: 50000 regional geological survey in northern Altyn. The zircon La-ICP-MS Ages of the rocks are (787±19)Ma, (776±24)Ma, (743±13)Ma, (740±23)Ma, respectively. These ages represent the respective emplacement time of each igneous intrusion, which indicate the magmatism frequently existed Neoproterozoic. This discovery provides a direct material basis for further studies on the regional tectonic setting and tectonic evolution.

Geochemical study has demonstrated granitic gneisses, monzonitic granitic gneisses and granodioritic gneisses belong to peraluminous calc-alkaline series. The gneisses, protolith of which are mainly greywacke and shale, are enriched in large ion lithophile elements Rb, Th, U, Pb, and depletion of high field strength elements Nb, Ta, and Sr obvious depletion. Gabbro diorite belongs to alkaline series, and the starting area of magma derived from partial melting of basalt. Comparing with above gneisses, the gabbro diorite yields a bit later age and is more remarkable negative anomaly of Eu. But the rare earth element spider diagrams and the REE distribution curves of the rocks share the similar characteristic, which may hint they have the characteristics of homologous evolution. Integrated with structural evolution, geochronology and geochemistry, we believe that granitic gneisses, monzonitic granitic gneisses and granodioritic gneisses were formed under the hinge tectonic environment of compressional orogeny to collision extension, and the gabbro diorite formed in intraplate extension.

