

^{40}Ar - ^{39}Ar thermochronological evidence for formation and tectonic exhumation of the northern-central segment of the Altyn Tagh Fault System in the Mesozoic, northern Tibetan Plateau

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To better constrain the probable timing of formation and evolution of the Altyn Tagh sinistral strike-slip system in the Mesozoic, a $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronological study has been carried out in the northern-central segment of the Altyn Tagh fault system, the northern margin of Qaidam Basin and the eastern Kunlun orogenic belt (Figure 1). Muscovite and biotite separated from mylonite, granite, pegmatite and metamorphic rocks have been analyzed and cooling histories of the K-feldspar have been modeled. The ranges of $^{40}\text{Ar}/^{39}\text{Ar}$ data in the middle-early Paleozoic, early and middle-late Mesozoic time periods, indicate that the peak metamorphic event along the Altyn Tagh fault system occurred during 450-420 Ma. And at ~250-220 Ma there was sinistral strike-slip shearing. Later at 164-155 Ma and ~100-89 Ma, sinistral strike-slip deformation and rapid tectonic exhumation along the Altyn Tagh fault system took place. Structural and thermochronological evidence demonstrates that sinistral strike-slip motion of the Altyn Tagh fault system

developed initially at ~250-220 Ma. After this event, multiple-stage deformation and exhumation proceeded.

The cooling histories in the northern margin of Qaidam Basin and the eastern Kunlun orogenic belt show that, similar to the northern segment of the Altyn Tagh fault system, these had experienced rapid cooling process during ~250-220 Ma (Figure 2). This regional tectonic and thermal cooling process indicates that the initial formation of the Altyn Tagh sinistral strike-slip fault system in the late Permian-early Mesozoic was coupled with or related to the suturing in the northern margin of the Qaidam Basin and the Kunlun orogenic belt, as well as suturing in Jinsha River suture zone between Qiangtang block and Kunlun-Bayankala geologic units. During 164-155 Ma and 100-89 Ma, cooling events along the Altyn Tagh fault system were accompanied by the closure along Bangong Lake-Nujiang suture zone, which developed differently on its eastern and western sectors during middle-late Jurassic and early Cretaceous, respectively.

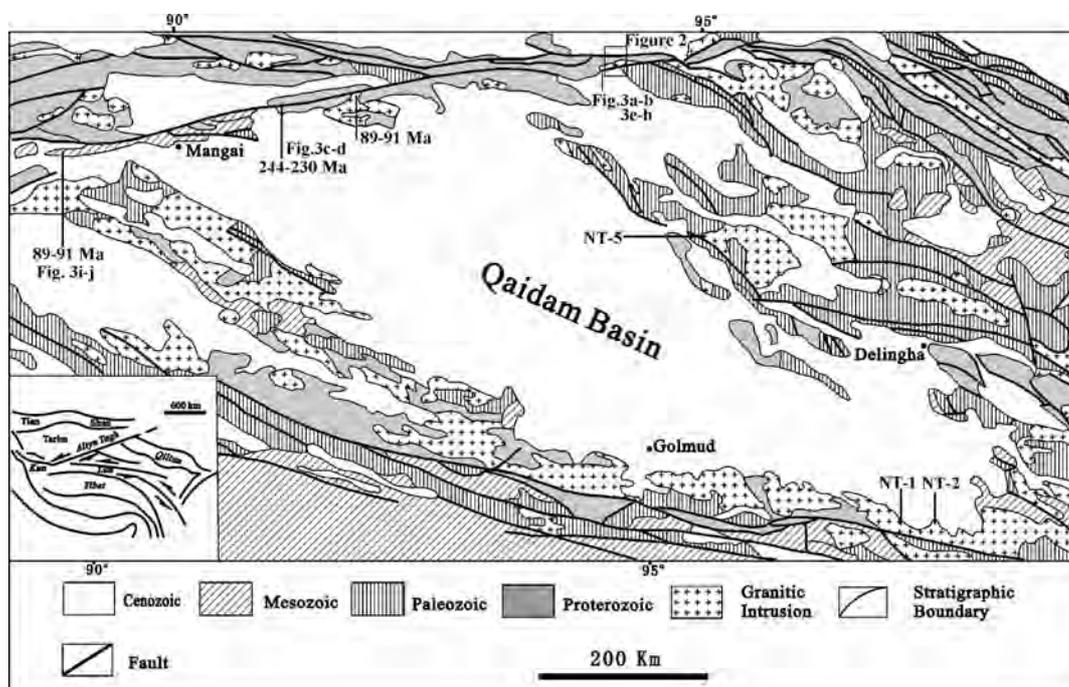


FIGURE 1. Regional geologic map of the Altyn Tagh fault system and its adjacent areas. In the figure, some sampled sites are shown (Simplified from Chen, 1990)

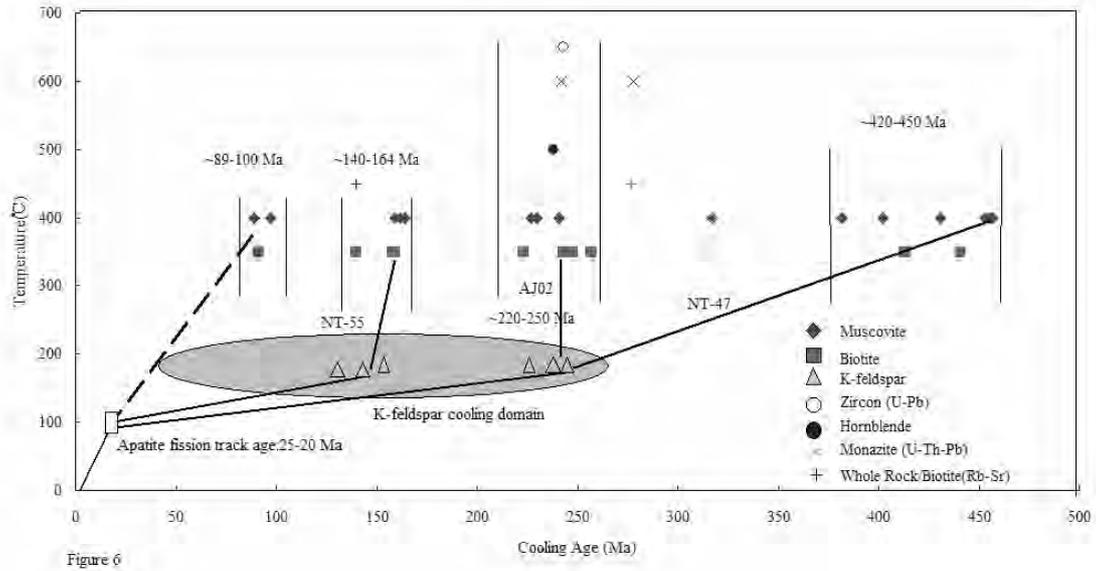


FIGURE 2. Analytical data and cooling diagram of age data from published and this time analysis. (Data compiled from various sources)