

Mesozoic-Cenozoic exhumation history of North Tianshan, Northwest China: Constrains from fission track analysis

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Fission track methods are used to examine at the exhumation history of North Tianshan, Northwest China.

Fifteen apatite samples and five zircon samples from volcanic rocks in Bogda mountains and granites in Harlik mountains were analysed. The apatite ages range from 109.3 ± 6.1 Ma to 11.9 ± 4.1 Ma and the zircon ages are within the range $81.7 \pm 7.8 \sim 56.8 \pm 5.1$ Ma. Results of calculation by paired-minerals indicate that the apparent exhumation rates range from 0.157 km/Ma to 0.222 km/Ma during the Late Cretaceous to Middle Cenozoic in above area. The thermal history modeled result shows four periods of exhumation in Bogda-Harlik mountains occurred in Early Cretaceous (119~105 Ma), late Late Cretaceous (67~65 Ma), Early-Middle Cenozoic (47~31 Ma) and Late Cenozoic (12~7 Ma) since Cretaceous.

Three apatite samples of Yandong pluton in Jueluotage mountains were analysed. The apatite fission track ages are within the range 94.7~87.4 Ma which reveal that the uplift was initiated at least in Late Cretaceous. There is good relationship between the current altitude and the sample age, namely ages begin to increase with increasing elevation. The average uplift rate of 0.039 km/Ma is calculated by extrapolation. Considering the uplift rate, the exhumation in Jueluotage mountains can be extremely slow since the Mesozoic.

Nine apatite samples are taken from Lianmuqin section in the central part of Turpan-Hami Basin and from both south and north piedmonts. Ages of seven Jurassic samples are distinctly younger than the depositional age, whereas ages of two Cretaceous samples are similar to or older than the depositional age. This indicates that annealing of the Jurassic samples is total or partial, whereas annealing of the Cretaceous samples is minimal. The thermal history modeled result shows that the samples experienced rapid tectonic uplift and cooling/exhumation during Late Cretaceous (120~100 Ma) and were buried and heated up again during the Cenozoic, finally exhumed to the surface from 10 to 8 Ma.

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