



Tracking the multi-stage exhumation history of the western Chinese Tianshan by Apatite Fission Track (AFT) dating [U+FF1A] Implications for the preservation of epithermal deposits in ancient orogenic belt

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The western Chinese Tianshan, located in the southern domain of the Central Asian Orogenic Belt (CAOB), was originally constructed by multiple accretion-collision processes in the Paleozoic, and was superimposed by complex intracontinental tectonic evolution in the Mesozoic-Cenozoic. Understanding the timing and mechanism of the latter geological processes is critical to unravel the preservation conditions of the epithermal deposits in the western Chinese Tianshan. This work presents new apatite fission track (AFT) data for three mountain ranges of the western Chinese Tianshan to track their exhumation history. Our AFT data gave a wide range of ages from 76.8 ± 5.5 Ma to 182.3 ± 9.9 Ma, and the mean confined fission track lengths are between 9.8 ± 0.5 μm and 12.3 ± 0.2 μm . The new data, in combination with the thermal history modeling [U+FF0C] enable us to attribute the exhumation history to three primary stages, including Early Permian (300-280 Ma), Late Triassic-Early Cretaceous (230-130 Ma), and Late Oligocene-Early Miocene (30-20 Ma). The first stage may be caused by the terrane accretion-collision in the late Paleozoic. The second stage was likely related to the closure of the Mongol-Okhotsk Ocean during the Mesozoic. The last one is regarded as the result of the collision between the Indian Plate and the Eurasia Plate in the Cenozoic. The extraordinary exhumation processes of these three major mountain ranges might have been responsible for sediment supply to the corresponding intra-mountain basins in the western Chinese Tianshan, and the particularly mountain-basin coupling evolution is ascribed to an essential condition for the preservation of epithermal deposits in ancient orogenic belt.