



Late Quaternary cooling rate constrained by multiple IRSL thermochronometers of potassium feldspars for granites from Kongur Shan, Chinese Pamir

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The Kongur Shan (East Pamir), located at the northwestern Tibetan Plateau, is one of the most active orogens on Earth, where both tectonic processes along major active faults and climatic forcing (extensive glaciers coverage) are contributing to the regional landscape evolution. The exhumation rates since late Miocene was constrained to be $\sim 6.5 - 4.2$ mm/yr. However, it is still debated whether the exhumation rate accelerated since the Quaternary, of which the climate was featured by the cyclic glaciations with periods of 100 ka and 40 ka. In this study, we tried to employ luminescence thermochronology, which is a still in developing method, to resolve the impact of glacial cycles on exhumation rate.

Our study site is located ~ 10 km to the east of the active Kongur normal fault, along the major valley of Gez river. We sampled three granite rocks from a sub-horizontal tunnel across the granite massif; one was from the entrance of the tunnel, and other two samples were from inside of the tunnel, where the measured ambient temperature is as high as $60-70$ °C. The distances of these samples are within 2 km. Four types of IRSL signals extracted from potassium feldspars (K-feldspars) were measured for each individual sample, and the results of isothermal decay experiments indicated these signals were of different thermal stabilities. Therefore, they may serve as four thermochronometers with different closure temperature. We employ these multiple thermochronometers together for each single sample to constrain their cooling rates. Our preliminary results, which are based on the simplified luminescence model of K-feldspars, suggest that the averaged cooling rate of the last 200 ka is as high as 1.4 °C/ka, which corresponds to an exhumation rate of ~ 2.3 to 0.9 cm/yr with the geothermal gradient assumed to be 60 to 150 °C/km. It seems to imply that the glacial cycles during the Quaternary substantially accelerated the exhumation rate of granite massif of Kongur Shan.