

Thermochronological constraints on Kateba'asu gold deposit in western Tianshan, Xinjiang, China

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Kateba'asu large-sized gold deposit is newly discovered in western Tianshan Mountains in China during early 2010s. Many giant gold deposits were found in western Tianshan Mountains, which is called Asian Gold Belt, stretching from Uzbekistan through Kyrgyzstan to Xinjiang, China.

The ore bodies, which are controlled by secondary fracture of Nalati north rim fault, mainly occurs in monzogranite rock mass. In order to constrain the metallogenic age, potassium feldspar of ore-forming period are analyzed by Ar-Ar dating method, yielding a plateau age of 257.4 ± 1.6 Ma. The age is much younger than the emplacement age of monzogranite, which is constrained in early carboniferous period by zircon U-Pb dating. The inconsistency between monzogranite emplacement age and metallogenic age indicates that the mineralization of gold is related to later hydrothermal process.

Low-temperature thermochronology is applied to constrain the exhumation history of Kateba'asu gold deposit. Zircon (U-Th)/He ages of five monzogranite samples ranges between 220 and 260 Ma, with a weighted mean age of 236.2 ± 3.5 Ma. Apatite (U-Th)/He ages of surface samples are concentrated in the early Cretaceous. Samples collected from drill holes show much younger apatite (U-Th)/He ages. The zircon (U-Th)/He ages demonstrate that the gold deposit was emplaced around 5.5 km depth during Triassic (assuming a paleogeothermal gradient of ~ 30 °C /km). The apatite (U-Th)/He ages of surface samples reveal that the deposit was emplaced around 2 km depth during the early Cretaceous epoch, and exhumated with an average rate of ~ 17 m/m.y. since then. The younger apatite (U-Th)/He ages of samples from drill hole probably reflect the partial retention of helium for higher temperature in deeper underground.