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Timing of right-lateral faulting along the Fuyun fault in southwestern Altai, NW China

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The Altai Mountains is a Late Cenozoic intracontinental mountain building belt which formed as a distant result of the India-Eurasia collision over 2000 km to the south. The NWN–SES striking Fuyun fault, extending about 200 km, is one of largest right-lateral strike-slip faults in the southwestern Altai Mountains. The M_S 8.0 Fuyun earthquake occurred on August 11, 1931 and produced an about 180 km-long surface rupture zone with a maximum offset of 12.5±2 m, which is the largest displacement caused by intraplate earthquakes around the world.

We document the geologic and geomorphic features along the Fuyun fault zone through analyses of high-resolution satellite images such as Landsat ETM, ASTER and IKONOS, combined with field investigations. The result shows that the largest cumulative offset of Pre-Quaternary rocks is about 28±2 km. Thus, we can estimate that the right-lateral faulting of the Fuyun fault might begin at ca. 7±1 Ma based on a long-term slip rate of 4±2 mm/yr. Furthermore, the different-scale streams across the fault zone show systematic offset. The largest stream offset is about 3 km, which may reflect the cumulative offset since middle Pleistocene. Similarly, some typical geomorphic features along a strike-slip fault such as pressure ridges and pull-apart grabens are also developed along the Fuyun fault zone.

In summary, the series of offset or displaced geomorphic features with various scales along the Fuyun fault provides an excellent example of geomorphological hierarchy formed by repeated large seismic events along a major strike-slip fault.

Keywords: Late Cenozoic; tectono-geomorphic features; strike-slip faulting; intracontinental mountain building; Altai Mountains