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Neotectonic activity and morphotectonic processes along the Bogd Fault Zone, SW Mongolia

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High magnitude earthquakes and arid climate conditions in the northern Gobi Altay ranges of southwestern Mongolia combine to create an interesting location for paleoseismological investigations. Pronounced NE-SW to E-W striking sinistral transpressive structures are the result of intraplate tectonics reactivating and overprinting older crustal fabrics. The Bogd Fault Zone is one of the northernmost examples of such sinistral transpression; it was subject to an 8.3 M earthquake in 1957 leading to surface ruptures with a total length of 260 km. Previous paleoseismological studies have shown that deformation rates estimated along both thrust- and strike-slip dominated fault segments are low: 0.1 mm/yr and 0.5-1 mm/yr, respectively.
In this study we aim to understand the tectonic activity along the Bogd Fault Zone in relation to its geomorphological expression, specifically along the faults on the northern margin of the Ikh Bogd mountain (44°59N; 100°13E). Ground-penetrating radar (GPR) profiles were performed to acquire structural and sedimentological data up to 22 m depth, the results of which have been combined with high-resolution digital elevation models (DEMs) retrieved from drone images. With this data, as well as structural and geomorphological field data and the results from cosmogenic and OSL dating, we aim to reconstruct past earthquakes in terms of their magnitude, slip rates, and return intervals.
Field results include observations of scarps/surface ruptures showing little degradation, offset drainages and alluvial sediments, ruptured pebbles and liquefied lake sediments. GPR profiles across faults show folded and terminated reflectors, indicating deformation of sediments at depth, possibly related to faulting. DEMs with resolutions of less than 10 cm are being used for mapping of local hydrological systems in detail, and to gain more insight into surface (rupture) morphologies.