



## Geomorphological evidence of active faulting in low seismicity regions - examples from the Valley of Lakes, southern Mongolia

Jorien L.N. van der Wal<sup>1</sup>, Veit C. Nottebaum<sup>2</sup>, Georg Stauch<sup>2</sup>, Frank Lehmkuhl<sup>2</sup>, and Klaus Reicherter<sup>1</sup>

<sup>1</sup>Institute of Neotectonics and Natural Hazards, RWTH Aachen University, Aachen, Germany

<sup>2</sup>Chair of Physical Geography and Geoecology, RWTH Aachen University, Aachen, Germany

The tectonically active northern margin of the Gobi Altai in southern Mongolia is best known for the 1957 Mw 8.1 Bogd earthquake. Cumulative offsets along the Bogd fault indicate that the area was subject to repeated earthquakes in the past. North of the Bogd fault, the Valley of Lakes characterises a seismically quiescent zone between the Gobi Altai and the central Mongolian Hangay dome, with little to no instrumentally recorded earthquakes. However, Quaternary alluvial fans of rivers that drain toward the endorheic lakes in this basin are crosscut by multiple fault scarps with displacements up to 15 m. Additionally, river channel morphology is significantly altered by tectonic lineaments indicating that, despite the lack of recorded seismicity, this area may indeed have been seismically active in the recent past. By applying remote sensing techniques, UAV photogrammetry, and morphometric studies, we aim to understand i) the effect these faults had on the landscape evolution of the Valley of Lakes, ii) their relationship to deformation along the Bogd fault and iii) whether these faults accommodate a significant amount of strain related to the India-Eurasia collision.

The lack of available material for dating requires palaeoseismological studies to make use of morphotectonic observations as an alternative, relative dating method. At the Bogd fault, such studies were combined with sparsely available cosmogenic nuclide age data to determine that vertical slip rates vary between 0.1 and 1 mm/yr on individual faults and at the scale of the entire mountain front, respectively. In the Valley of Lakes, a total lack of age data complicates the extrapolation of slip rates, however scarp degradation indicates that slip rates are likely lower than at the Bogd fault. Fluvial terraces of the Tuyn Gol river are crosscut by at least three major fault scarps, which contribute to valley width variations of the river from  $\pm 3500$  m to  $\pm 20$  m at the current fan apex, and which are reflected in steepness index variations along minor drainages. Additionally, a large paleochannel suggests that major drainage reorganisation events took place in Quaternary times, either reflecting periods of high tectonic activity or as a result of significant climate variations. The transtensional nature of some faults in the Valley of Lakes is unique; however fault mechanisms in the area are generally in line with the active deformation in the Gobi Altai. Our results stress the earthquake potential of regions with low instrumental seismicity and demonstrate that deformation in the Gobi Altai may reach further north than previously expected.

**How to cite:** van der Wal, J. L. N., Nottebaum, V. C., Stauch, G., Lehmkuhl, F., and Reicherter, K.: Geomorphological evidence of active faulting in low seismicity regions - examples from the Valley of Lakes, southern Mongolia, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-949, <https://doi.org/10.5194/egusphere-egu2020-949>, 2019