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Timing and evolution of the deformation in a restraining bend: example of the Ih Bogd massif, Gobi-Altay, Mongolia

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Our study focuses on the strain evolution of a restraining bend (Ih Bogd massif) along the Bogd fault, a major intracontinental active strike-slip fault in Mongolia. Restraining bends have been mainly studied in terms of fault structures and kinematics, but few examples provide chronological data on their formation through the time. The Ih Bogd massif allows such an analysis because the morphology is exceptionally well preserved and shows clear relationships between topography and structures. A morphotectonic and a structural analysis are coupled with Apatite Fission Tracks and 10Be data to constrain the ages of uplifted markers.

This massif is 50 km long, 25 km wide, and characterised by a flat summit plateau perched at about 4000 m, corresponding to a surface uplift of more than 2 km. Fission Tracks data showed that the uplift began 5 ± 3 My ago. Topographical profiles across the massif are characterised by a "staircase" morphology corresponding to the uplift of ancient piedmonts. This staircase morphology is controlled by the outward migration of reverse faulting, which reactivates inherited pre-Cenozoic structures.

The 10Be dating of alluvial terraces overthrusted within the massif indicates that during the phases of massif widening, the deformation is distributed on different subparallel faults for periods of several 100 kyrs. The widening of the massif is probably at the origin of a change in the kinematics of the faulting, mainly oblique in the early stages and now partitioned on strike-slip and reverse segments. The youngest stage of

this mountain building corresponds to the occurrence of frontal thrust faults affecting Quaternary alluvial fans (forebergs) located 1-5 km apart from the main relief. Lateral growth of these faults during the 1957 M8.3 Gobi-Altay earthquake is consistent with the widening process of the restraining bend by accretion of successive blocs.