Bedrock incision and surface uplift rates of the western Hangay Dome, Mongolia

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The origin of relief of the Hangay Mountains is problematic because they are situated in western Mongolia, far from any plate boundary or major tectonic structure. By correlating and dating straths of differing heights preserved along valleys incising the western Hangay Dome, it is possible to deduce the record of stream incision over time and relate this to the tectonic or isostatic processes that contribute to the relief. Two approaches are undertaken. The first is to study the pattern of the paleo-longitudinal profiles in selected valleys throughout the study region. Data were collected in the field, and complimented with satellite imagery of identified strath surfaces. We will analyze the surfaces and recreate paleo-profiles of the modern incised rivers to identify the history of the stream. The second approach is to determine the age of the exposed straths, to help confirm our correlation of the straths in Approach 1, but also to estimate the rates of incision between periods of strath abandonment by using cosmogenic ^{10}Be and ^{36}Cl exposure dating of the strath surfaces. The age of strath abandonment can be calculated, which will be interpreted to represent the time when the river continued to incise its bed, exposing the remaining bedrock bed surface to cosmogenic nuclides. Given the age of river abandonment, and paleoriver and modern river elevation, we can approximate river incision rate. If uplift has occurred in the dome, the strath surfaces will show faster incision rates at the head of the river, so the paleo-longitudinal profiles will converge downstream. Alternatively, if incision was due to a drop in base level (i.e., extra-dome basins to the west have subsided), then incision rates will be relatively slower in headwaters, and the paleo-long profiles will diverge downstream. After establishing if the dome rocks are uplifting (or if the basin is dropping) we can interpret the rates of rock uplift (or subsidence) and determine if the rates have varied over time. These results are important because it will help understand the incision history over the past few million years. Patterns of variability may be able to fingerprint unique cause of the relief, such as a late Cenozoic mantle avalanche (which, for instance, would be potentially identified as having a period of very rapid incision preceded and followed by a slower rate). By analyzing the uplift (or subsidence) of the Hangay Dome, we will have a greater understanding of the intracontinental movement, and lateral motions in the greater plate tectonics theory.

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