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Vertical-axis clockwise rotations and crustal shortening in a left-lateral strike-slip system: Paleomagnetic analysis of the Gobi Altai Mesozoic-Cenozoic volcanic province (Mongolia)

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Following Paleozoic amalgamation of the Asian continent, the Mesozoic history of southern and eastern Mongolia was characterized by widespread sedimentation and volcanism. During the Cenozoic, collision between India and Asia led to a NNE-SSW directed compressive stress-field in central Asia, which in Mongolia initiated a regional array of left-lateral transpressive strike-slip faults in the south, and a right-lateral transpressive strike-slip system in the west, accommodating motion around a stable Precambrian basement block (Hangay dome).

Two end-member scenarios explain why the Mongolian strike-slip systems became transpressional: the first suggests that these strike-slip faults utilize obliquely oriented weak Paleozoic or Mesozoic zones in the basement. The second scenario suggests that initial strike-slip faults become transpressional as a result of vertical axis rotations, due to increased shortening from east to west in the Gobi Altai.

To test these hypotheses, we carried out a paleomagnetic investigation in the northeastern Gobi Altai. Our fieldwork indicates that widespread Early Cretaceous Mesozoic sedimentation and volcanism in the region is associated with rifting. Following deposition of the rift-sediments, at least four phases of localized magmatism occurred in

the Late Cretaceous, Paleocene, Oligocene and Neogene. We regionally sampled the Lower Cretaceous basalts, and some younger lavas and basalt plugs.

A total of 1500 cores were drilled in how many?localities, each subdivided into 7-10 sites of 7 samples each. These were then AF and thermally demagnetized. Curie temperatures around 560-600˚C indicate magnetite as the principal carrier of the magnetic signal. The preliminary results indicate a consistent small, but discernible clockwise rotation ($\sim$10˚) for the northeast Gobi Altai region, which locally increases to $\sim$25-35˚ towards the terminations of two major restraining bends. Clockwise rotations within a left-lateral strike slip system are consistent with the interpretation that Cenozoic crustal shortening in southern Mongolia increases westward. We also compare our results with the published apparent polar wander path for stable Eurasia to test models of Mongolia-Eurasia relative motion following Late Jurassic closure of the Mongol-Okhotsk Ocean.