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## **Inclination Shallowing in Eocene Linzizong Sedimentary Rocks From Southern Tibet Correction, Possible Causes, and Implications for Reconstructing the India-Asia Collision**

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A systematic bias towards low palaeomagnetic inclination recorded in clastic sediments, i.e., inclination shallowing, has been recognized and studied for decades. Identification, understanding and correction of this inclination shallowing is critical for palaeogeographic reconstructions, particularly those used in climate models and to date collisional events in convergent orogenic systems, like that surrounding the Neotethys. Here we report palaeomagnetic inclinations from the sedimentary Eocene upper Linzizong Group of Southern Tibet that are  $\sim 20^\circ$  lower than conformable underlying volcanic units. At face value, the palaeomagnetic results from these sedimentary rocks suggest the southern margin of Asia was located  $\sim 10^\circ\text{N}$ , which is inconsistent with recent reviews of the palaeolatitude of Southern Tibet. We apply two different correction methods to estimate the magnitude of inclination shallowing independently from the volcanics. The mean inclination is corrected from  $20.5^\circ$  to  $40.0^\circ$  within 95% confidence limits between  $33.1^\circ$  and  $49.5^\circ$  by the elongation/inclination (E/I) correction method; an

anisotropy-based inclination correction method steepens the mean inclination to  $41.3^\circ \pm 3.3^\circ$  after a curve fitting-determined particle anisotropy of 1.39 is applied. These corrected inclinations are statistically indistinguishable from the well-determined  $40.3^\circ \pm 4.5^\circ$  mean inclination of the underlying volcanic rocks providing an independent check on the validity of these correction methods. Our results show that inclination shallowing in sedimentary rocks can be corrected. Careful inspection of stratigraphic variations of rock magnetic properties and remanence anisotropy suggests shallowing was caused mainly by a combination of syn- and post-depositional processes such as particle imbrication and sedimentary compaction that vary in importance throughout the section. Palaeolatitudes calculated from palaeomagnetic directions from Eocene sedimentary rocks of the upper Linzizong Group that have corrected for inclination shallowing are consistent with palaeolatitude history of the Lhasa terrane, and suggest that the India-Asia collision began at  $\sim 20^\circ\text{N}$  by 45-55 Ma.

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