The crustal-scale shortening on the eastern margin of the Tibet plateau: the main mechanism of uplift-revealed from deep seismic reflection profiles across the Min Shan and Hu Ya Fault

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The easternmost portion of the Tibetan plateau has long been a key region for studying the uplift mechanism of the Tibetan Plateau, especially after the 2008 Ms. 7.9 Wenchuan earthquake. However, previous studies have assumed that easternmost Tibet is tectonically homogeneous, and the tectonic significance of the Min Shan has been overshadowed by that of its more conspicuous neighbour, the Longmen Shan region. Here, we describe the crustal geometry of the Min Shan region using two newly obtained deep seismic reflection profiles (for their location see Fig. 1). In this study, we identified an upper-lower crust mechanical decoupling within the Min Shan region; the Min Shan region is tectonically delineated by an inherited boundary fault zone, the Huya fault zone, which was responsible for triggering the 2017 Jiuzhaigou M 7.0 earthquake. Together with the gravity dataset and previous studies in this area, the outlined crustal geometry indicates that crustal-scale shortening at the eastern plateau margin is a primary mechanism driving uplift, although extensive uplift might also have occurred due to the decoupled shortening between the upper and lower crust.

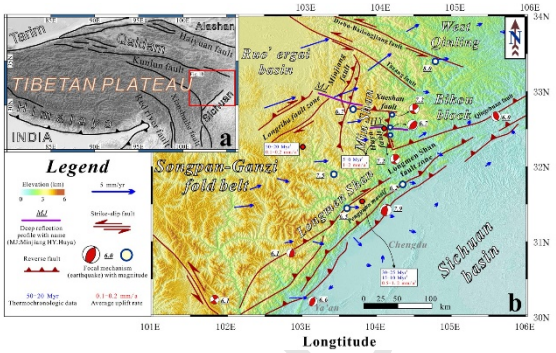

Figure 1. Simplified regional tectonic map of the eastern margin of the Tibetan Plateau. (a) Map showing the location of the deep seismic reflection profile. (b) A simplified structural map and shaded topographic relief GPS measurements indicating current crustal deformation; the Min Shan-Hu Ya fault and Longmen Shan regions are depicted by a primarily northeastward extrusion.

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