



The vertical slip rate of the Sertengshan piedmont fault, Inner Mongolia, China

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The vertical slip rate of a normal fault is one of the most important parameters for evaluating its level of activity. The Sertengshan piedmont fault has been studied since the 1980s, but its absolute vertical slip rate has not been determined. In this paper, we calculate the displacements of the fault by measuring the heights of piedmont terraces on the footwall and the stratigraphic depths of marker strata in the hanging wall. We then calculate the vertical slip rate of the fault based on the displacements and ages of the marker strata. We selected nine sites uniformly along the fault to study the vertical slip rates of the fault. The results show that the elevations of terraces T3 and T1 are approximately 1060 m and 1043 m, respectively. The geological boreholes in the basin adjacent to the nine study sites reveal that the elevation of the bottom of the Holocene series is between 1017 and 1035 m and that the elevation of the top of the lacustrine strata is between 925 and 1009 m. The data from the terraces and boreholes also show that the top of the lacustrine strata is approximately 65 ka old. The vertical slip rates are calculated at 0.74-1.81 mm/a since 65 ka and 0.86-2.28 mm/a since the Holocene. The slip rate is the highest along the Wujiahe segment and is lower to the west and east. Based on the findings of a previous study on the fault system along the northern margin of the Hetao graben basin, the vertical slip rates of the Daqingshan and Langshan faults are higher than those of the Sertengshan and Wulashan faults, and the strike-slip rates of these four northern Hetao graben basin faults are low. These results agree with the vertical slip components of the principal stress field on the faults. The results of our analysis indicate that the Langshankou, Wujiahe, and Wubulangkou areas and the eastern end of the Sertengshan fault are at high risk of experiencing earthquakes in the future.