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The Influence of the M8.1 Nepal Earthquake on the Seismic Activity in the Qinghai-Tibet Block

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Historical seismic data with the M≥5 earthquakes that occurred in the Himalayan arc zone, Qinghai-Tibet block and its adjacent area are collected. Based on the earthquake catalogue of China Earthquake Network Center (CENC), the paper compares the records of the National Earthquake Information Center (NEIC). We study the important influence of the M8 earthquake in the middle of the Himalayan arc belt on the seismicity of the Qinghai-Tibet block in the paper. Our results show that (1) Similar large earthquakes occurred in the middle section of the Himalayan arc belt in 1934 and 2015. As a result of the collision and extrusion of Indian plate to Eurasian plate,a 2800 km long plate boundary arc convergence zone is formed, which is the Himalayan collision zone. In the middle of the Himalayan collision zone, on 15 January 1934, the M8.1 earthquake occurred in Bihar, Nepal-India, which caused a 200∼300km rupture of the middle section of the Himalayan main boundary fault zone, extending 150km from south to north (Chander R, 1989). An M8.1 earthquake occurred again on 25 April 2015 in Pokhara, Nepal. The aftershocks spread about 200km long along the middle section of the Himalayan main boundary fault zone and 150km wide from south to north. (2) After the large earthquakes in the Himalayan collision zone, the interior of the Qinghai-Tibet block was affected by the large earthquake rupture of the low-dip along the main Himalayan thrust fault (MHT:Main Himalayan Thrust). The positive fault type earthquakes are increasing in the south Tibet detachment system and Nearly north-south extensional fault basin controlled by the south Tibet detachment system. For example, the M8.1 earthquake occurred in Nepal on 25 April 2015. The M5.9 earthquake that occurred in Dingri Tibet on the same day was a normal fault tensional activity in the north-south direction.(3) After the large earthquake in the Himalayan collision zone, some thrust earthquakes occurred on the northern boundary of the Qinghai-Tibet block as well. For example, on 21 January 2016, an M6.4 earthquake occurred in Menyuan of Qinghai province, which is located near the junction area between the Lenglongling fault and Tuocaishan fault in the eastern section of Qilian mountain seismic belt. The focal mechanics mechanism shows the event is a thrust earthquake.(4) After the large earthquake in the Himalayan collision zone, the activity distribution belt of mid-strong earthquakes formed from the Himalayan collision zone to the northeast boundary of Qinghai-Tibet block. It indicates that the Qinghai-Tibet block accumulates high stress level during the collision and extrusion process of the Indian plate to Eurasian plate.