Strong Earthquake Evolution Characters Around the Eastern Boundary Faults of Sichuan-Yunnan Rhombic Block

Jia Cheng^{12*}, Jie Liu¹, Weijun Gan¹, Huaizhong Yu¹, Gang Li¹ ¹China Earthquake Network Center, Beijing 100045, China ²State Key laboratory of Earthquake Dynamics, Institute of Geology, China Earthquake Administration, Beijing 100029, China

Based on the specific date of fault segmentation, characteristic earthquakes and historical earthquakes characters, and their empirical relationships, we obtained the parameters of the fault segments, like length, width, magnitudes of characteristic earthquakes. Constrained by GPS velocity field, we inversed the slip rate of the fault segments in depth using the 3-D half-space dislocation model. As not all of the recurrence periods and co-seismic displacements of characteristic earthquakes were known, we selected the fault segments with known these two parameters and calculated the accumulation rate of average co-seismic displacement, which shows the faults' slip rate in seismogenic layer. Then compared the slip rate in depth and in seismogenic layer, the relationship between them was obtained, and this relationship was used to get the recurrence periods and co-seismic displacements of all fault segments.

After the studies above, we calculated the co-seismic deformation field of all the earthquakes large than Ms 6.8 from AD 1700 successively and inversed the potential displacement in the co-seismic deformation field. Then we divided the potential displacement by the slip rate from GPS inversion to get the influences of these fault segments, and added the influences into the elapsed time of the characteristic earthquakes, and obtained the earthquake hazard degree of all the segments we studied in the form of the ratio between elapsed time and recurrence periods, So we call it the Impending Earthquake Risk. Historical earthquake cases show that the fault segment is in security when the Impending Earthquake Risk is less than 1 and become dangerous after the Impending Earthquake Risk bigger than 1. In the year

^{*} E-mail: chengjiajc@gmail.com

2009, the earthquake hazard degree is large than 1 on the segments below, Tagong segment of Xianshuihe fault, Menggu-Dongchuan fault segment, Dongchuan-Xundian segment and Yiliang-Chengjiang segment of Xiaojiang fault, the values are 1.35, 1, 1.04 and 1.09 respectively.