Surface ruptures produced by the 2001 Ms 8.1 Central Kunlun (China) earthquake

aiming lin[1], Bihong Fu[2]

[1] Institute of Geosciences,Shizuoka Univ, [2] Graduate School of Science and Technology, Shizuoka Univ.

http:/www.ipcs.shizuoka.ac.jp

The Ms 8.1 Central Kunlun earthquake of14 November 2001 was triggered by the active Kunlun fault in the Central Kunlun mountain area, northern Tibet. A co-seismic surface rupture zone of a nearly 400 km long, called Kunlun rupture zone, occurred along the western segment of the Kunlun fault. Field investigations show that the surface ruptures are distributed in a zone with width ranging from few to several hundreds of meters, generally from 5 to 50 m. The rupture zone is composed of distinct shear faults, extensional cracks, and mole tracks. The left-lateral offsets are measured by using the surface deformation marker such as present-day glacier, moraine, stream channel, gully, and road, which vary from few tens of cm to 16.3 m, but generally from 4 m to 8 m. The maximum displacement up to 16.3 m was observed across a rupture zone of 550 m wide. Both the rupture length and maximum displacement are the largest among the co-seismic surface rupture zones ever reported worldwide. The co-seismic deformation characteristics of surface markers reveal that the earthquake had a purely strike-slip focal mechanism. Both the geological and geomorphological evidence indicates that the geometry of the ruptures is controlled by the pre-existing Kunlun fault. The large amounts of strike-slip and rupture length produced by the earthquake support the hypothesis that the Kunlun faultplays an important role of strike-slip partitioning in the rapid eastward extrusion of Tibet to accommodate the continuing penetration of Indian plate into Euro-Asian plate. The Central Kunlun earthquake provides an exceptional opportunity to study the geometry of co-seismic rupture structures along a large strike-slip fault for further understanding the relationship between the fault geometry and rupturing process.