Geometric features of surface ruptures associated with the 2001 Ms8.1 Kunlun earthquake from satellite images

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The Ms 8.1 Central Kunlun earthquake occurred on 14 November 2001 along the pre-existing Kunlun fault in the north Tibet, China. The geometric features of the surface ruptures associated with this event was unclear because the most of the surface ruptures developed in remote mountain areas, the northern Tibet where the average elevation is more than 4500 m and is difficult to access. Especially in the west segment of surface rupture zone where is located in the region crowned by high mountains (up to 6860 m at the Buka Daban Peak), glaciers, and marshes. We employ the satellite remote sensing technique to identify and document the geometric characteristics of the surface ruptures by comparing Landsat TM/ETM and SPOT images before and after the earthquake. The results indicate that the west end of surface ruptures is located in the southeast Buka Daban Peak where the surface ruptures display as horsetail pattern. To the east, the surface ruptures displaced the young fluvial fans, stream channels and the present moraine deposits and passed through the south part of the Kusai Lake and the north of the Kunlun Pass along the pre-existing seismic faults. The surface ruptures terminated atthe east of the Kunlun Pass. The satellite images also show that the strong surface deformation developed in the northeast Kusai Lake where the surface ruptures of 300-600 m in width is composed of 2-3 distinct sinistral faults. The nearly 400-km-long surface rupture zone produced by this event is the longest among the coseismic surface ruptures ever reported worldwide. The results identified from satellite images are consistent with the data obtained from the field investigation (Lin et al., 2002). High resolution satellite remote sensing technique provides us a rapid and powerful method to document the geometric features of coseismic rupture zone in remote and inaccessible regions like Tibet Plateau.