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2010年青海玉树M_S7.1级地震地表破裂带和形变特征分析

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The surface rupture and coseismic deformation characteristics of the M_S7.1 earthquake at Qinghai Yushu in 2010

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摘要 通过对SPOT卫星影像上地表破裂的目视解译,以及对ALOS PALSAR卫星数据进行D-InSAR形变提取和分析,结合地震活动性、震源机制、活动构造等资料,确定了发震断层空间分布、断层性质和同震形变场分布特征.结果显示,玉树地震发生在甘孜—玉树断裂带上,总体走向约为300°,断层近乎直立.根据相干性强弱将Ⅰ区地表破裂划分为三段:北段长22 km,中段长5 km,南段长6 km,破裂带总长度约33 km.Ⅱ区内非相干带长约10 km.同震形变场分布在78 km×55 km范围内,主震所在的形变Ⅰ区断层两侧视线向相对位错约为0.78 m,转换成水平位错约为1.5 m;余震所在的Ⅱ区形变相对较小.

关键词: 玉树地震 差分干涉测量 地表破裂带 同震形变场

Abstract: The surface rupture of the Yushu M_S7.1 earthquake was identified through visual interpretation of SPOT images and the coseismic deformation was extracted with differential interferometric SAR using the ALOS PALSAR data. Based on the above results, combining with seismic activity, focal mechanism, active tectonics as well, the complexity of the causative ruptures, the faulting characteristics and the distribution of coseismic deformation were finally determined. The results showed that the Yushu earthquake occurred on the nearly vertical Garzê-Yushu fault, which has an average strike of about 300°. According to the property of SAR coherence data, the surface rupture of zone Ⅰ extends for about 33 km totally and can be divided into three segments, that is, the northern, middle, and southern segment of length 22 km, 5 km, and 6 km, respectively. There is an incoherence strip about 10 km long in zone Ⅱ. The relative dislocation on both sides of the fault is about 0.78 m in the line of sight direction in the rupture zone Ⅰ, corresponding to about 1.5 m horizontal movement. The value of displacement in the zone Ⅱ is smaller in contrast with the displacement value of zone Ⅰ.

Keywords: Yushu earthquake Differential interferometry SAR Surface rupture zone Coseismic deformation field

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