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利用GPS观测资料分析2008年于田 M_S 7.3地震的同震位移及震后形变

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Coseismic and postseismic deformation of M_S 7.3 Yutian earthquake derived from GPS data

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摘要

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摘要 2008年3月21日新疆于田发生 M_S 7.3级地震. 本文通过处理、分析GPS数据, 得到破裂断层北侧100 km附近的同震位移及震后形变信息. 在观测区域GPS点监测到10 mm左右的同震位移, 其中最大为南向14 mm, 东向5 mm. 同震位移呈现一致性的东南向运动特征, 证实于田地震存在显著的左旋走滑分量. 震后台站向西南方向运动, 与同震位移方向不同, 说明同震位移和震后形变具有不同的形变源. 近普鲁断裂两侧的GPS点震后运动方向存在明显差异, 表明于田地震可能触发了普鲁断裂的左旋滑动. 普鲁断裂在于田地震发生后呈现的构造活动特征揭示普鲁断裂是康西瓦—西阿尔金断裂带的一部分, 兼具左旋走滑与逆冲分量, 吸收了青藏高原西北缘相对于塔里木盆地的东向逃逸与北向入侵作用.

关键词: 于田地震 GPS 同震位移 震后形变 普鲁断裂 应力触发

Abstract: We use GPS data to study coseismic and postseismic deformation of the 21 March 2008 M_S 7.3 Yutian earthquake occurred in southern Xinjiang, western China. The coseismic displacements recorded at GPS sites located ~100 km north of the fault show clearly a coherent southeastward motion, and reveal that the Yutian earthquake had a significant left-lateral slip component. The GPS postseismic displacements show a different pattern from the one of coseismic displacements, suggesting that the coseismic and postseismic displacements observed at GPS sites were induced by different sources. Although the Pulu fault has been considered primarily a thrust fault, the spatial distribution of postseismic deformation field of the Yutian earthquake implies that sinistral afterslip might have been triggered along the Pulu fault. The postseismic deformation field suggests active tectonic deformation along the Pulu fault, and attests that this fault is part of the Karokash-Western Altyn Tagh fault system, accommodating the eastward extrusion of the northern Tibetan plateau with respect to the Tarim basin.

Keywords: Yutian earthquake GPS Coseismic displacement Postseismic displacement Pulu fault Stress triggering

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