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基于线弹性位错模型反演1997年西藏玛尼M_w7.5级地震的干涉雷达同震形变场——Ⅱ滑动分布反演

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摘要 1997年11月8日西藏M_w7.5级玛尼地震是干涉雷达技术应用于地震观测以来的一次重要事件.在第一部分中，我们应用广泛使用的Okada线弹性位错模型，假设断层的各个分段滑动量均匀，反演得到断层各个分段的几何参数和均匀滑动量.本部分的反演进一步去除滑动均匀假设，并利用更能反映断层真实状态的角形元位错模型（线弹性），在第一部分反演得到断层几何的基础上，反演断层面的静态位错分布.反演结果表明，线弹性滑动分布模型能够更好地解释观测数据，进一步提高反演的数据拟合程度.最终得到了断层面上的走滑和倾滑位错分布.首次得到的断层面滑动分布显示断层面滑动在浅部（0～12 km）比较集中，地震破裂长度约170 km，最大左旋走滑位移达4.8 m；反演结果还表明局部段落存在较大倾滑位移，量值达到1.9 m，这在断层模型中是不能忽略的，它可能是断层两侧形变不对称的原因之一；反演得到的标量地震矩为2.18×10^{20} N·m，相当于矩震级M_w7.5，与Velasco等利用地震波形反演得到的结果一致.

关键词 玛尼地震 干涉雷达 同震形变 线弹性 均匀滑动反演 滑动分布反演

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Parameter inversion of the 1997 Mani earthquake from INSAR co-seismic deformation field based on linear elastic dislocation model—Ⅱ. Slip distribution inversion

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Abstract The Nov. 8, 1997 Mani (Xizang) M_w7.5 earthquake is an important event since Synthetic Aperture Radar Interferometry was used for earthquake studies. In the first part we use the widely-used Okada linear elastic dislocation model a
nd assume uniform slip on fault segments to invert the geometric parameters and the uniform slip. In this part we remove the uniform slip assumption, use more realistic angular dislocation model (linear elastic) to invert the static slip di
stribution on fault. The inversion result shows that this linear elastic slip distribution can explain the data better, and the goodness of fitting is improved
further. We get both of the strike-slip distribution and the dip-slip distribution on the fault plane. The first time acquired slip distribution indicates that the fault slip concentrates mainly in the shallow depth (0～12 km), the earthquake rupture is 170-km-long, the maximum left-lateral strike-slip is 4.8 m; the inversion result also shows that there are large dip-slip on some segments and their magnitude reaches 1.9 m, which can't be ignored in the inversion. The dip-slip may be one of the reasons of the asymmetric deformation pattern beside the two sides of the fault; the inverted seismic moment is 2.18×10^{20} N·m,
equal to magnitude M_w7.5 It's consistent with the seismic waveform inversion of Velasco.

Key words Mani earthquake;SAR interferometry;Co-seismic deformation;Linear elasticity;Uniform slip inversion;Distributed slip inversion

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