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基于汶川地震序列震源机制解对龙门山地区构造变形模式的初步探讨

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Preliminary study on tectonic deformation models in the Longmenshan region based on focal mechanism solutions of the Wenchuan earthquake sequence

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摘要

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摘要 本文采用理论震源机制解的分析方法,以汶川地震序列震源机制解为约束,探讨龙门山地区构造变形模式及其与汶川地震序列的关系.通过有限元模拟,计算了龙门山地区不同构造变形模式下的构造应力场,得到了理论震源机制解,并与汶川地震序列实际震源机制解进行对比分析,初步探讨了该区构造变形模式对汶川地震序列的影响.结果显示,在龙门山地区,青藏高原内深部构造变形快于地表的构造变形模式下,区域构造应力场对应的理论震源机制解与汶川地震序列震源机制解的相符程度较高.这种一致性可能表明:(1)青藏高原内部深部构造变形快于地表,是龙门山地区比较合理的构造模式;(2)构造应力场是影响汶川地震序列震源机制的重要因素.

关键词 汶川地震序列, 震源机制解, 构造变形模式, 理论震源机制解

Abstract: Adopting the method of theoretical focal mechanism solution, using the focal mechanism solutions (hereafter referred to as FMSs) of Wenchuan earthquake sequence (hereafter referred to as WES) as the constraint, the effect of different tectonic models in West Sichuan on WES is discussed. Employing the finite element method, considering different models of tectonic deformation, different tectonic stress fields of the Longmenshan region are simulated. According to the tectonic stress fields, theoretical FMSs are calculated and compared with the practical FMSs. The result shows that the tectonic stress field in this region, corresponding to the model that deformation rates increasing with depth in the Tibetan Plateau, is most consistent with the FMSs of WES. The consistency may lead to two conclusions: (1) the model that deformation rates increase with depth in Tibetan Plateau is more reasonable for the Longmenshan region; (2) the regional tectonic stress field is an important dynamic factor to WES.

Keywords Wenchuan earthquake sequence, Focal mechanism solution, Tectonic deformation model, Theoretical focal mechanism solution

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