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论文

GPS初步结果揭示的中国大陆水平应变场与构造变形

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摘要: 根据中国大陆不同来源的多个GPS区域监测网1991~1999年间的观测资料和“中国地壳运动观测网络”基本网1998~2000年的观测资料, 联合处理得到中国大陆地壳水平运动速度场结果, 通过最小二乘配置法建立中国大陆水平运动速度场模型, 获得了基于连续介质假设的中国大陆水平应变场(或称为视应变场)初步结果. 分析了水平运动、应变场空间分布特征及其与强震的关系, 并简要分析了2001年11月14日昆仑山口西8.1级大地震的区域构造变形背景. 结果表明: 中国大陆中西部构造变形强烈, 应变速率值高, 又以青藏块体及其边缘和新疆西部最为显著. 除川滇、新疆西部外, 大部分地区的近东西向断裂存在左旋剪切变形, 近南北向的断裂存在右旋剪切变形. 而东部地区构造变形相对较弱. 强震通常发生在剪切应变率的高值区及其边缘, 尤其是与构造变形背景相一致的剪应变率高值区. 昆仑山口西8.1级地震发生在最显著的东西向左旋剪切应变率高值区, 从该区域的应变状态分析, 具备近东西向断裂产生巨型走滑破裂错动的构造变形背景.

关键词: 水平应变场 构造变形 昆仑山口西8.1级地震 中国大陆

HORIZONTAL STRAIN FIELD AND TECTONIC DEFORMATION OF CHINA MAINLAND REVEALED BY PRELIMINARY GPS RESULT

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Abstract: From the observations of various GPS networks during 1991~1999 and basic network of China Crustal Movement Observation Network during 1998~2000 in China Mainland, the united solution of horizontal velocities have been calculated in this paper. On the basis of assumption of continuous medium a model of horizontal velocity field is established with the aid of the least square collocation, and the preliminary results of horizontal strain fields (or called apparent strain fields) of China Mainland are presented. The characteristics of spatial distribution of horizontal motion and strain field, and their relationship with strong earthquakes are analyzed. A brief analysis is given for tectonic deformation background of the MS 8.1 earthquake on the west of Kunlun mountainpass on Nov.14, 2001. The results show that strong tectonic deformation and high strain rate exist in the mid western China Mainland, being the most remarkable in Qinghai xizang block and its margins and western Xinjiang. In most of areas, except Sichuan Yunnan and western Xinjiang, the nearly east westward faults show sinistral shear deformation, while the nearly south northward faults show dextral shear deformation. However the eastern China Mainland shows weaker tectonic deformation.

Strong earthquakes occurred in the high value region and its margins of shear strain rate, especially in the high value region of shear strain rate in accordance with tectonic deformation background. The M_s 8.1 earthquake on the west of Kunlun mountain pass occurred in the most obvious high value region of east-westward sinistral shear strain rate, and this region had tectonic deformation background that nearly east-westward fault produced dislocation of huge strike-slip rupture from the situation of strain.

Keywords: Horizontal strain field Tectonic deformation The M_s 8.1 earthquake on