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现代大地测量学——地壳形变场

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中国大陆地壳运动与汶川 $M_S8.0$ 级地震孕育的关系

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Crustal motion of Chinese mainland and preparation of $M_S8.0$ Wenchuan earthquake in Sichuan Province

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摘要

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摘要 根据网络工程的GPS站点观测资料, 计算相对中国大陆整体1999~2007年的趋势运动速率和2004~2007年的动态运动速率, 用青藏亚板块和华南亚板块的参数计算龙门山断裂带的活动参量, 研究了中国大陆运动场和其变化, 分析了地壳运动场的特征与汶川 $M_S8.0$ 级地震的孕育关系. 结果揭示出: 现今地壳的运动分区与地质新构造单元基本一致, 显示现代地壳构造活动是新构造运动的继承和发展; 中国大陆地壳运动的动力主要与印度板块、太平洋板块与欧亚板块的相互碰撞俯冲产生的作用力有关. 汶川 $M_S8.0$ 级地震的发生, 主要是由于印度板块对青藏亚板块的向北推挤、产生侧向运动, 致使龙门山断裂带遭受挤压产生能量积累所致. 2004~2007年的地壳动态运动, 使龙门山断裂带走滑活动加强, 从稳定的压应变积累状态转入了剪切作用下的易活动状态.

关键词 中国大陆, 水平运动, 态变化, 汶川地震

Abstract: We calculated the move velocities in Chinese mainland for 1999~2007 years and dynamic move velocities for 2004~2007 years according to the data from Crustal Movement Observation Network of China. We calculated the activity parameters of Longmenshan fault zone based on the parameters of Qinghai-Tibet and South China subplates, studied the change of the motion field of Chinese mainland, and analyzed the relations between the characteristics of the motion field of the crust and the Wenchuan $M_S8.0$ earthquake. The mentioned researches revealed that the present-day crustal motion zoning is basically consistent with the geological neotectonic units, indicating that the recent crustal tectonic activity is the inheritance and development of the neotectonic movement; The dynamic force of crustal motion of Chinese mainland is mainly associated with the action caused by the mutual collision and underthrust of India plate, and Pacific plate to the Eurasia plate. The $M_S8.0$ Wenchuan earthquake is mainly due to the lateral motion caused by the northward pushing of India plate to Qinghai-Xizang subplate, resulting in that Longmenshan fault is compressed to accumulate energy for the $M_S8.0$ Wenchuan earthquake. The crustal dynamic motion in the period of 2004~2007 strengthened the strike slip of Longmenshan fault zone and it transformed from the stable state of compressive strain accumulation to an easy active state under shear force.

Keywords Chinese mainland, Horizontal movement, Dynamic variation, Wenchuan earthquake

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