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中国大陆地壳地震震中分布的卫星磁异常约束

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Constraints from satellite crustal magnetic field on the distribution of the epicenters for earthquakes in the continental crust of China

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摘要

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摘要 陆壳中的地震更危险,但其分布更具有弥散性,尤其在中国大陆地区;因此可靠且易用的地震警示信息显得非常重要.目前这类信息主要来自历史地震目录,大地测量及构造等资料,还需要补充其它的地学资料.本文提出一种来自卫星地壳磁场的约束.对于中国大陆的壳内地震($M_S \geq 5.0$),研究表明其大都(80%以上)位于卫星地壳磁场的垂向磁感应强度分量的零等值线上或附近,并且理论上可以用一作用于半无限磁弹性平面中的集中力所产生的磁场分布来进行相应解释.尽管存在许多不确定因素,这种新的独立于传统资料的约束,提供了更为详细的地震警示性信息.同时,在缺少历史地震目录,大地测量及构造资料的地区,这种约束可作为一种先导性的监测信息加以使用.

关键词 地震警示性信息, 大陆地壳地震, 卫星地壳磁场, 磁弹性

Abstract: Earthquakes in the continental crust are more dangerous, but they are distributed diffusely, especially in China. Therefore available and reliable earthquake risk information is very important. At present the risk information of earthquake is mainly from instrumental and historical catalogs, geodesy or tectonics, which needs more data or constraints from other geo-scientific data. Here we presented such a constraint from satellite geo-magnetic field. For epicenters of the earthquakes in the continental crust of China, study here shows that most of them (>80%) are at or near the zero-contours of the vertical component of the crustal magnetic induction at the surface observed by the satellite, which can be explained by the magnetic induction from a line concentrated force (earthquake) in a magnetized half plane. Although there are many uncertain factors, such a constraint which is independent of traditional data provides more detailed risk information on the seismicity in the crust. This constraint can also be used as an early and rough monitor for the shallow earthquakes before the further work of instrument, geodesy and tectonics.

Keywords Risk information of earthquake, Continental earthquakes, Satellite geo-magnetic field, Magnetoelasticity

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