

引用本文(Citation):

陈光齐, 武艳强, 江在森, 刘晓霞, 赵静. GPS资料反映的日本东北 $M_W$ 9.0地震的孕震特征. 地球物理学报, 2013, 56(3): 848-856, doi: 10.6038/cjg20130314

CHEN Guang-Qi, WU Yan-Qiang, JIANG Zai-Sen, LIU Xiao-Xia, ZHAO Jing. Characteristics of seismogenic model of  $M_W$ 9.0 earthquake in Tohoku, Japan reflected by GPS data. Chinese Journal Geophysics, 2013, 56(3): 848-856, doi: 10.6038/cjg20130314

## GPS资料反映的日本东北 $M_W$ 9.0地震的孕震特征

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Characteristics of seismogenic model of  $M_W$ 9.0 earthquake in Tohoku, Japan reflected by GPS data

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摘要

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### 摘要

在对海洋板块俯冲型地震孕震模式的分阶段变形特征进行分析的基础上, 结合同震位错反演结果分析了 $M_W$ 9.0级地震的同震变形特征, 分析过程中通过精度检验讨论了该反演结果的可靠性. 通过对震前和同震GPS结果的对比分析, 讨论了二者的差异性. GPS应变(率)结果表明, 震前日本岛应变积累主要反映了太平洋板块和菲律宾板块的俯冲作用, 同震结果表现为指向震源方向拉张应变的释放, 对日本岛的主要影响区域介于 $35^\circ$  N和 $43^\circ$  N之间. 震前和同震GPS剖面结果反映的变形特征具有互补性, 但量值相差上百倍. 震前的GPS速度、应变率剖面和时间序列结果表明靠近日本岛东海岸一侧可能存在变形趋于极限现象. 通过对此次地震可能前兆的分析表明, 中长期预测方面、震前GPS时间序列的趋势性偏离、前震活动、震源区b值降低等现象在一定程度上反映了此次地震的孕震特征.

关键词 孕震模式, 同震位错反演, GPS应变率场, GPS剖面分析

### Abstract:

Based on the analysis of deformation characteristics in different stages of seismogenic model in oceanic plate subduction regions, we analyzed the coseismic deformation characteristics of  $M_W$ 9.0 earthquake using the inversion result of coseismic dislocation, whose reliability has been analyzed before used. Then, we discussed the differences between longterm and coseismic deformation from GPS data. GPS strain (rate) illustrates that the strain accumulation reflects the seduction effects of Pacific and Philippine plate before this earthquake, while the result of coseismic event reflects tension strain release whose affecting region mainly located between  $35^\circ$  N and  $43^\circ$  N. The deformation features reflected by GPS profile before earthquake and coseismic event are complementary, though the value differs by hundreds of times. GPS velocity and strain rate profile and GPS time-series results showed that the deformation had possibly reached its limit on the east coast of Japan. Through analyzing the possible precursor of this earthquake, the result including medium- and long-term forecasting, deviation to tendency background of GPS time series, pre-earthquake events and decreasing of b-value in hypocenter region, perhaps reflect the characteristics of seismogenic model in some extent.

Keywords Seismogenic model, Inversion of coseismic dislocation, GPS strain rate field, Analysis of GPS profile

Received 2012-04-06; published 2013-03-20

Fund:

地震行业专项(201008007)和日本JSPS科研费(基盘研究(B); 22310113, G.Chen)联合资助.

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