

引用本文(Citation):

杨少敏, 兰启贵, 聂兆生, 王庆良, 李恒, 廖华, 谭凯, 乔学军, 王琪. 用多种数据构建2008年汶川特大地震同震位移场. 地球物理学报, 2012, 55(8): 2575-2588, doi: 10.6038/j.issn.0001-5733.2012.08.009

YANG Shao-Min, LAN Qi-Gui, NIE Zhao-Sheng, WANG Qing-Liang, LI Heng, LIAO Hua, TAN Kai, QIAO Xue-Jun, WANG Qi. Coseismic displacement caused by the 2008 great Wenchuan earthquake derived from various types of geodetic data. Chinese J. Geophys. (in Chinese), 2012, 55(8): 2575-2588, doi: 10.6038/j.issn.0001-5733.2012.08.009

## 用多种数据构建2008年汶川特大地震同震位移场

杨少敏<sup>1,2</sup>, 兰启贵<sup>3</sup>, 聂兆生<sup>1</sup>, 王庆良<sup>4</sup>, 李恒<sup>1</sup>, 廖华<sup>5</sup>, 谭凯<sup>1</sup>, 乔学军<sup>1</sup>, 王琪<sup>2\*</sup>

1. 中国地震局地震研究所, 地震大地测量重点实验室, 武汉 430071;
2. 中国地质大学(武汉)地球物理与空间信息学院, 行星研究所, 武汉 430074;
3. 四川测绘地理信息局, 四川省第一测绘工程院, 成都 610100;
4. 中国地震局第二监测中心, 西安 710054;
5. 四川省地震局防灾研究所, 成都 610041

Coseismic displacement caused by the 2008 great Wenchuan earthquake derived from various types of geodetic data

YANG Shao-Min<sup>1,2</sup>, LAN Qi-Gui<sup>3</sup>, NIE Zhao-Sheng<sup>1</sup>, WANG Qing-Liang<sup>4</sup>, LI Heng<sup>1</sup>, LIAO Hua<sup>5</sup>, TAN Kai<sup>1</sup>, QIAO Xue-Jun<sup>1</sup>, WANG Qi<sup>2\*</sup>

1. Key Laboratory of Earthquake Geodesy, Institute of Seismology, China Earthquake Administration, Wuhan 430071, China;
2. Institute of Geophysics & Geomatics, Planetary Science Institute, China University of Geosciences, Wuhan 430074, China;
3. First Institution of Survey Engineering, Sichuan Administration of Surveying Mapping & Geoinformation, Chengdu 610100, China;
4. Second Monitoring Center, China Earthquake Administration, Xi'an 710054, China;
5. Institute of Hazard Mitigation and Life Assistance, Sichuan Earthquake Administration, Chengdu 610041, China

摘要

参考文献

相关文章

Download: PDF (5646KB) HTML KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 本文主要以GPS、精密水准观测和卫星SAR遥感图像分析2008年汶川特大地震同震位移特征。GPS数据包括:(1)四川盆地和川西高原地区各类国家等级GPS网点复测;(2)沿破裂带国家天文大地网GPS复测。前者推算的同震位移测定精度优于2 cm,后者6~8 cm。SAR遥感资料包括:(1)ALOS 卫星升轨相干干涉图像,精度优于8 cm;(2)ALOS和ENVISAT卫星影像合成的三维位移图,精度优于0.5 m。同震位移场显示,断层下盘(四川盆地)变形总体呈扇形集中指向震中,断层上盘(龙门山)变形总体上呈逆时针旋转态势,最大的实测水平位移5.5 m。汶川、理县、茂县等地测站位移指向破裂带方向,而平武、青川等地测站逐渐转变为平行,乃至远离破裂带方向,与汶川地震逆冲兼走滑的破裂特征一致。断层上盘大幅隆升,下盘靠近断层的区域以下沉为主,远场表现为幅度很小的隆升,垂直升降区域间,有一条与龙泉山断裂带平行的升降过渡带,调节龙泉断层的应力状态。用实测变形场检验多个地震波破裂模型表明,近场(距离断层50 km)模型形变准确度可达40~50 cm,远场精度优于5 cm。

关键词 汶川地震, 大地测量, 同震位移场

Abstract: We analyze the coseismic surface displacement field produced by the 2008 Wenchuan ( $M_w 7.9$ ) earthquake using various geodetic data including GPS measurements, SAR images, in combination with other data such as leveling, gravity and near-field strong motion records. The GPS data come from resurveys on several high-precision GPS networks and a triangulation network. Coseismic displacements at GPS sites are estimated to within 2 cm and triangulation points within 6~8 cm in precision. Two kinds of SAR data are used in the paper, including light-of-sight SAR interferograms with a precision better than 8 cm and three-dimensional surface displacements using SAR sub-pixel correlation to within 0.5 meters in precision. The coseismic displacements constructed by various types of data are characterized by the deformation pattern of a coherent motion of the footwall and anticlockwise rotation of the hanging wall. Site horizontal offsets in the Sichuan Basin are found to direct toward to the epicenter. Otherwise, the GPS sites in Wenchuan, Lixian and Maoxian along the Longmen Shan moved normal to the surface rupture as well. However, the GPS sites in Pingwu and Qingchuan were displaced initially parallel to and finally away from the rupture zone, in consistent with the rupture mechanism of thrusting-slip and right lateral strike-slip faulting. Whereas the hanging wall was uplifted significantly, the subsidence in the footwall was localized near the rupture zone. The far-field uplift in the Sichuan Basin is found with a hinge line (separating uplift from subsidence) parallel to the Longquan Shan fault. Finally, we test seismological slip models by fitting the coseismic displacement field, from which a mean misfit of 40~50 cm is derived for the GPS sites within 50 km to the rupture zone, and 5 cm for ones in the far-field.

### Service

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- Email Alert
- RSS

### 作者相关文章

- 杨少敏
- 兰启贵
- 聂兆生
- 王庆良
- 李恒
- 廖华
- 谭凯
- 乔学军
- 王琪

Keywords [Wenchuan earthquake](#), [Geodesy](#), [Coseismic displacement field](#)

Received 2012-01-27;

Fund: 国家自然科学基金(40974011), 中央级公益性科研院所基本科研业务专项(IS200916006)和中国地震局喜马拉雅计划项目资助.

Corresponding Authors: 王琪, 男, 1962年生, 博士, 教授, 主要从事大地测量、地球动力学研究. E-mail: wangqi@cug.edu.cn Email: wangqi@cug.edu.cn

链接本文:

<http://118.145.16.227/geophy/CN/10.6038/j.issn.0001-5733.2012.08.009> 或 <http://118.145.16.227/geophy/CN/Y2012/V55/I8/2575>

[查看全文](#) [下载PDF阅读器](#)

Copyright 2010 by 地球物理学报