

现代大地测量学——地壳形变场

汶川 M_S 8.0级地震InSAR同震形变场观测与研究

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摘要 利用InSAR技术,采用地震前后日本ALOS/ PALSAR数据,提取了2008年5月12日四川汶川地震7个条带的地表同震形变场.每个形变条带南北向500 km,东西向70 km,7个形变场覆盖了映秀镇、都江堰、茂县、北川、平武和青川.结果显示,此次地震地表破裂带在北川—映秀断裂带上.地表破裂带从汶川县映秀镇西南震中附近一直到青川县苏河北侧,全长约为230 km.发震断层西北盘为抬升盘,南东盘断层附近,仍然表现为隆起区,显示出以逆冲为主的断层性质.在汶川县映秀镇西侧震中区,最大相对卫星视线向形变量达260 cm,如果全部换算成垂直形变,则两个区域的垂直相对形变达3.3 m.从北川至平通一带,卫星视线向形变范围在120~180 cm的隆起带.其中,擂鼓镇隆起形变范围170~180 cm,换算成垂直形变约在2.2~2.3 m之间.在青川苏河北附近,有70~80 cm范围的隆起形变.在雅安、峨眉山一带,以及射洪至重庆北侧一带有大范围沉降区.在重庆及其南侧区域有幅度在20~30 cm小范围隆起.由青川向东至广元、宁强一带,有形变幅度在60~70 cm的隆起区.整个形变场影响范围较大,四川盆地出现了不同程度的地表形变.

关键词 [汶川地震](#) [地震活动性](#) [差分干涉测量技术](#) [同震形变场特征](#)

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Coseismic surface deformation caused by the Wenchuan M_S 8.0 earthquake from InSAR data analysis

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Abstract We use the InSAR technology to process and analyze the ALOS/PALSAR satellite data of Japan before and after the Wenchuan, Sichuan M_S 8 earthquake of 12 May 2008. The result shows seven belts of coseismic surface deformation that cover Yingxiu, Dujiangyan, Wenchuan, Maoxian, Beichuan, Pingwu and Qingchuan, each belt is 500 km in north-south and 70 km in east-west. The investigation indicates that the surface rupture zone caused by the earthquake coincides with the Beichuan-Yingxiu fault, extending from nearby the epicenter southwest of the Yingxiu town, Wenchuan county to north of the Suhe, Qingchuan county for about 230 km. The northwest wall of the seismogenic fault has uplifted, and its southeast wall has also risen nearby the fault, exhibiting a dominant thrust motion. The maximum relative displacement in LOS(Looking of satellite) direction at the epicenter reaches 260 cm, and the overall vertical displacement between the two fault walls is up to 330 cm. A swell of 120~180 cm displacements in LOS direction is present from Beichuan to Pingtong, where the displacements at the Leigu town are 170~180 cm equivalent to vertical displacements 220~230 cm. Another uplifted belt of displacements 70~80 cm occurs nearby north of Suhe, Qingchuan. Around Ya' an and Emeishan Mount, and from Shehong to north of Chongqing, there is a large area of subsidence. In Chongqing and its south is seen a small uplifted area of 20~30 cm. From Qingchuan, eastward to Guangyuan and Ningqiang, uplift amplitudes are 60~70 cm. The whole area of the deformation field is fairly large, even in the Sichuan basin occurs surface deformation of different degrees.

Key words [Wenchuan earthquake](#); [Earthquake activity](#); [D-InSAR](#); [Co-seismic deformation field](#)

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