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单站GPS测速在实时地震监测中的应用

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Real-time tracking the instantaneous movement of crust during earthquake with a stand-alone GPS receiver

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摘要

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摘要

本文提出一种利用单站GPS载波相位或多普勒观测数据,基于单站GPS测速法实时确定地震监测台站运动状态(速度)的新方法.针对2010年4月4日发生于墨西哥Baja California(32.259° N,115.287° W)北部的 M_w 7.2级EI-Mayor-Cucapah地震事件,选取震中邻近区域(200 km内)若干采样率为5 Hz的高频GPS观测站数据进行实验.结果表明:基于新方法所得测站速度结果能够很好地反映出地震期间监测台站的瞬时运动状态,测站P496和P744计算的速度结果与其并置强震仪观测结果具有很好的一致性.

关键词 高频GPS数据, 单站GPS测速, 实时地震监测, 强震仪

Abstract:

We proposed a new method to record the instantaneous movement of crust during earthquake with a stand-alone Global Positioning System (GPS) receiver for real-time seismic monitoring. In the method, the velocity of GPS station is precisely estimated based on the Doppler shift method by only using standard GPS broadcast products and high-rate carrier phase measurements, which are available in real time. We analyzed the 5 Hz GPS data collected by UNAVCO-Plate Boundary Observatory (PBO) network from five stations in near-field areas within 50~100 km from the epicenter during the M_w 7.2 EI-Mayor-Cucapah earthquake occurred on 4 April 2010 in Baja California (32.259° N,115.287° W), and compared the results with strong-motion seismograph records. The GPS results find a good agreement with the integrated strong motion seismograph record, and the earthquake waveforms can be fully recovered. Exciting performance demonstrates the potential application of this method.

Keywords [High-rate GPS data](#), [Velocity determination with a single GPS receiver](#), [Real-time seismic monitoring](#), [Strong-motion seismograph](#)

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