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利用高频GPS进行地表同震位移监测及震相识别

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Coseismic displacement monitoring and wave picking with high-frequency GPS

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摘要

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摘要 结合日本3.11大地震,利用近震区和远震区若干测站的高频GPS观测数据,采用动态精密单点定位技术分析了强震时复杂的地表运动时序,获得了地表同震位移.在此基础上提出利用S变换对高频GPS地震波进行震相识别,有效拾取了P波初至,反演了P波传播速度并与地震仪数据、USGS提供的参考值进行了对比和分析,为后续地震应急、地震预警提供了重要的、科学的决策依据.

关键词 高频GPS, 同震位移, 日本地震, 震相识别, P波初至, S变换

Abstract: High-rate kinematic analysis coupled with global positioning system (GPS) has become one of the effective methods to observe the dynamic crustal deformations caused by earthquake. In this article, kinematic precise point positioning (PPP) technology was used for monitoring the complex surface vibration behavior and coseismic displacements with high-frequency GPS data from stations in near-field and teleseismic areas during the 11 March 2011 moment magnitude 9.0 Tohoku Earthquake. Furthermore, we proposed the S-transform algorithm for the primary wave (P-wave) arrival picking from high-rate GPS (HR-GPS) seismic waves. And its performances were compared with nearby seismograph records and the theoretical value provided by U.S. Geological Survey (USGS).

Keywords High-rate GPS data, Coseismic displacement, Tohoku earthquake, Wave picking, Arrival time, S-transform

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