

High-rate (1 Hz to 20 Hz) GPS coseismic dynamic displacements carried out during the Emilia 2012 seismic sequence

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Abstract

In May-July 2012, Emilia Romagna (northern Italy) was struck by a significant seismic sequence, which was characterized by two moderate-magnitude earthquakes: a Ml 5.9 event on May 20, 2012, at 02:03:53 UTC, and a Ml 5.8 event on May 29, 2012, at 07:00:03 UTC, about 12 km to the west of the first mainshock. The earthquake sequence produced a total of 20 casualties and severe and widespread damage, mainly to historical and commercial buildings. A detailed description of the seismic sequence can be found in Sco-gnamiglio et al. [2012, this volume]. The largest of the earthquake static displacements were recorded by tens of continuous global positioning system (cGPS) stations, as described in Serpelloni et al. [2012, this volume]. Most of these stations were operating with a sampling frequency of 1 Hz, and they belonged to scientific or commercial networks: RING (<http://ring.gm.ingv.it>); ITALPOS (<http://smartnet.leica-geosystems.it>); GeoTop (<http://www.netgeo.it>); Fondazione Geometri Emilia Romagna (<http://www.gpsemiliaromagna.it>); Lombardia (<http://www.gpslombardia.it>); and Veneto (<http://147.162.229.63>). Some hours after the first mainshock, the sampling frequency of the near-field RING stations (SBPO and MODE) were switched to 20 Hz, thus recording the coseismic displacements produced by the May 29, 2012, earthquake at higher frequency. This sampling frequency was previously used for the detection of coseismic dynamic displacements only for the Mw 9 Tohoku-Oki 2011 event [Colosimo et al. 2011b]. Thus, the 20-Hz-sampling displacements for the Tohoku-Oki 2011 earthquake and the May 29, 2012, Emilia event might represent important recordings to investigate coseismic contributions at frequencies higher than 1 Hz with GPS. In the present study, after the description of the high-rate GPS (HRGPS) data analysis, we will show and compare the preliminary results. Then, for the two mainshocks, we will compare the displacements recorded by the HRGPS (1 Hz up to 20 Hz) and the strong-motion time histories (100 Hz) at MODE, where the different instruments were approximately co-located (Figure 1, inset, relative distance of ca. 90 m). [...]

Keywords

HRGPS; GPS data processing; Strong motion

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References

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
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