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Ground displacements of the Cephalonia Mw 6 earthquakes on January 26 and February 3, 2014 as recorded by High-Rate GPS data

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Continuous GNSS (Global Navigation Satellite Systems) networks deployed over the last years to study deformation of the crust have been recently considered to estimate epoch-wise displacements during moderate to large earthquakes. Thanks to their significantly improvements in accuracy and their high sampling rate GNSS stations are increasingly becoming important tools, not only for geodesists but also for seismologists. This study focuses on the displacements recorded by Continuous GPS (CGPS) stations of NOANET (Ganas et al., 2011) during the two M6 mainshocks, occurred on 26 January and 3 February 2014 onshore the Greek island of Cephalonia (central Ionian Sea). We estimated the displacements from the high-rate CGPS data collected at the stations close to the epicenters by using state-of-art data processing strategies (Fig. 1). The time series of displacements at sampling rate of 1Hz and 5Hz are processed in kinematic precise point positioning (PPP) mode and analyzed both in time and frequency domains. We compared the GPS displacement waveforms with accelerometer data recorded from a strong motion, “quasi” co-located station and verified the good agreement between the two time series. We found that, despite the similar magnitudes and comparative locations of hypocenters, the earthquakes showed different amplitudes in the co-seismic displacements. This can be explained by a difference in focal depth and different mechanics of rupture as supported also by the focal mechanisms. The earthquakes in Cephalonia recorded by the CGPS stations demonstrated the usefulness of the Greek CGPS network even in monitoring of moderate size earthquakes at a local scale.

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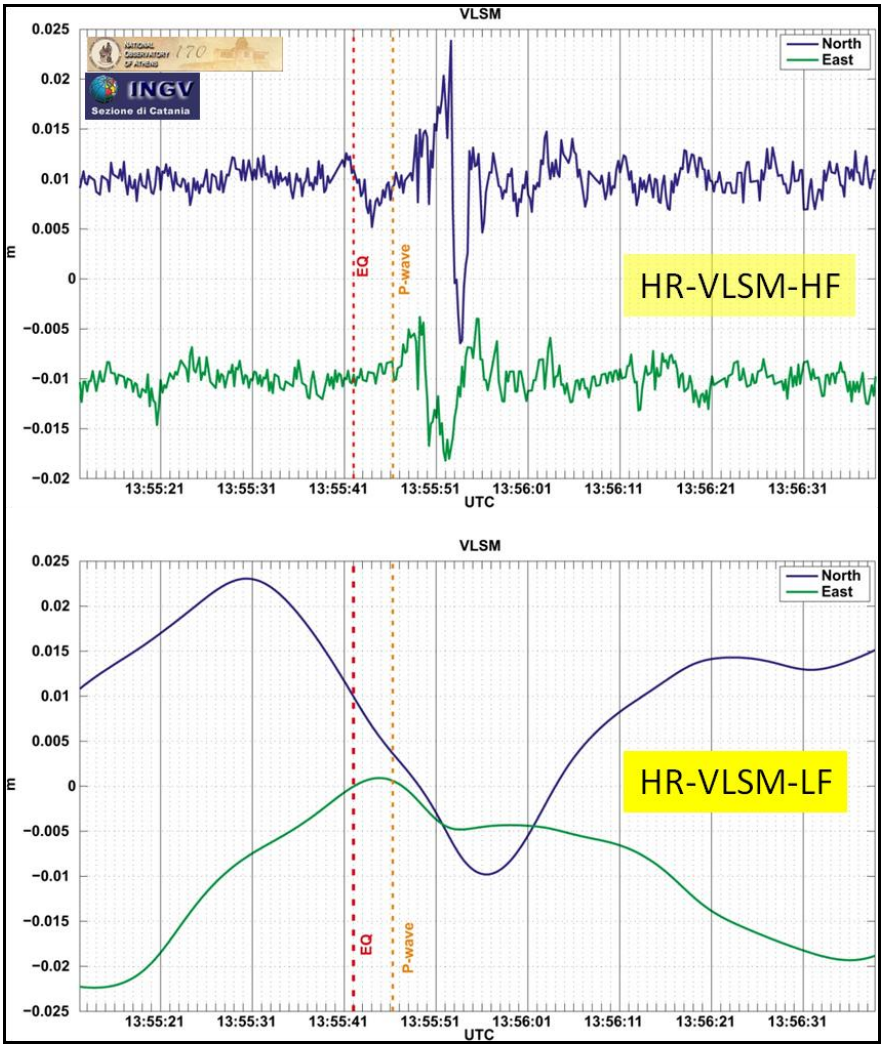

Figure 1. Displacement waveform for Jan. 26, 2014 event onshore Cephalonia. The average standard deviation associated to the horizontal components is 0.03 m. The high-frequency transients (HR-VLSM-HF) are separated from the low frequency displacements (HR-VLSM-LF).

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