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Coseismic deformation pattern of the Emilia 2012 seismic sequence imaged by Radarsat-1 interferometry

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Abstract

On May 20 and 29, 2012, two earthquakes of magnitudes 5.9 and 5.8 (Mw), respectively, and their aftershock sequences hit the central Po Plain (Italy), about 40 km north of Bologna. More than 2,000 sizable aftershocks were recorded by the Isti-tuto Nazionale di Geofisica e Vulcanologia (INGV; National Institute of Geophysics and Volcanology) National Seismic Network (http://iside.rm.ingvit/). The sequence was generated by pure compressional faulting over blind thrusts of the western Ferrara Arc, and it involved a 50-km-long stretch of this buried outer front of the northern Apennines. The focal mechanisms of the larger shocks agree with available structural data and with present-day tectonic stress indicators, which show locally a maximum horizontal stress oriented ca. N-S; i.e. oriented perpendicular to the main structural trends. Most of the sequence occurred between 1 km and 12 km in depth, above the local basal detachment of the outer thrust fronts of the northern Apennines. We measured the surface displacement patterns associated with the mainshocks and some of the larger aftershocks (some of which had Mw >5.0) by applying the Interferometric Synthetic Aperture Radar (InSAR) technique to a pair of C-Band Radarsat-1 images. We then used the coseismic motions detected over the epicentral region as input information, to obtain the best-fit model fault for the two largest shocks. [...]

Keywords

2012 Emilia earthquake; SAR Interferometry; Seismogenic sources; Fault modeling

Full Text: PDF

References

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