Geophysical Research Abstracts
Vol. 20, EGU2018-18656, 2018
EGU General Assembly 2018

Triggered slip and hydrotectonics on nearby faults caused by the October 30, 2016 Mw 6.6 earthquake in central Italy

Stefano Gori (1), Emanuela Falcucci (1), Fabrizio Galadini (1), Michele Saroli (2,1), Marco Moro (1), Christian Bignami (1), Matteo Albano (1), Daniele Cinti (1), Nunzia Voltatturni (1), Lorenzo Lo Sardo (2), Marco Petitta (3), and Francesco Savi (4)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy (stefano.gori@ingv.it), (2) Università degli Studi di Cassino e del Lazio meridionale, Italy, (3) Sapienza Università di Roma, Italy, (4) Regione Umbria, Perugia, Italy

The Mw 6.6 earthquake occurred on 30th October, 2016 in central Italy is the main shock of the seismic sequence began on 24th August 2016 with the Mw 6.2 Amatrice earthquake and that is still ongoing. The 30th October event – the strongest in central Italy since the 1915 Avezzano earthquake (Mw 7.0) – nucleated along the Mt. Vettore-Bove active normal fault system, a major active extensional tectonic structure of the central Apennines. Several km-long and metre-scale surface faulting occurred all along the main synthetic and antithetic splays of the fault system. Some km to the west, in the Mt. Vettore-Bove fault hanging wall, the Norcia basin is located. The depression is bounded by another active normal fault system in the east, parallel to the Mt. Vettore-Bove fault. This structure caused the 14th January, 1703 seismic event (Mw 6.9). After the October 30 event, we surveyed hundreds of metres-long surface fractures (up to 15-20 cm vertical throw) in the Norcia plain, not ascribable to any gravitational processes or seismically induced liquefaction. We then dug four trenches across these fractures. The excavations showed that the observed ground offset corresponded to a synthetic and an antithetic splay of the Norcia fault system. This evidence testifies to sympathetic/triggered slip of the Norcia fault system, that broke the surface. Moreover, the Torbidone river re-appeared in Norcia after the October event and some springs formed or increased the discharge along the sympathetically re-activated fault splays. Coseismic satellite data (InSAR) revealed that the observed surface fractures along the Norcia fault splays occurred in a zone that underwent upward bending and western dislocation caused by the October 30 event owing to the Mt. Vettore-Bove fault slip. Geochemical analyses of the waters evidenced a twofold water contribution, that is, groundwater contained within the alluvial infill of the Norcia basin and a much deeper aquifer related to the major carbonate hydrostructure.
Hence, together with the triggered slip on the Norcia fault, the collected data indicate that the Mw 6.6 earthquake caused deepwater rising along the pre-existing Norcia fault system.