Geophysical Research Abstracts
Vol. 20, EGU2018-9200, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

3D-geological model of the superficial faults reactivated during the 2016 Central Italy seismic sequence

Tiziano Volatili (1,2), Emanuele Tondi (1,2), Giuseppe Pasquini (2), Pietro Paolo Pierantoni (1), Riccardo Teloni (2), Miller Zambrano (1,2)

(1) University of Camerino, School of Sciences and Technology, Geology division, Italy (tiziano.volatili@unicam.it), (2) Geomore s.r.l, spin-off of the University of Camerino, Camerino (MC), Italy (info@geomore.it)

The 2016 Central Italy earthquake sequence, consisted of three main shocks and thousands of secondary events, produced significant surface ruptures along the SW-dipping normal Mt. Vettore-Mt. Bove Fault System (VBFS).
The seismic sequence started on the 24 August with a Mw 6.0 mainshock located at 1km west of Accumoli village. After this event, ∼N155°-trending surface ruptures, mostly SW dip-slip kinematics, were recorded for several kilometers along the southern portion of the VBFS (Aringoli et al., 2016). Two months later (26 October), a new mainshock of Mw 5.9 occurred at 3 km NW of Castel Sant'Angelo sul Nera village, caused discontinuous ground ruptures along the northern portion of the VBFS. After 4 days (30 October) the largest shock of Mw=6.5 occurred close to the Norcia village. The latter event produced coseismic effects on an area of nearly 450 km2 mainly consisting of primary surface ruptures, accompanied with other secondary effects like landslides (OpenEMERGEO Working Group, 2017). An almost continuous pattern of surface ruptures was observed for an overall length of 20-25 km along the whole VBFS, generally reactivating the 24 August and the 26 October 2016 ground ruptures. Surface rupture displacement exhibits predominantly normal dip-slip kinematics, with an average 0.5 m vertical offset.
Notably, the ∼N155° striking alignment of ground ruptures typically follows the trace of previously mapped faults (Pierantoni et al., 2013), while in some locations the coseismic ruptures occurred along fault splays that were not previously recognized. The whole structures array represents the surficial expression of the largest deep seismogenic fault characterizing the VBFS.
In this work we present a 3D geological model of the VBFS, powered by a former high geological and structural knowledge of the area and a robust database about coseismic fault reactivation (e.g. orientation, length, throw; OpenEMERGEO Working Group, 2017). Furthermore, a comparison of the geological and coseismic offset by means of length/displacement profiles has been carried out, leading to the retrodeformation of the three faulting events.
The aim of this study is (i) to characterize the highly fragmented surface ruptures observed after the Mw=6.5 seismic event in terms of fault dimensional parameters and (ii) to compare the long- and short-term deformation along the VBFS. The achieved results contribute to a better understanding of the existing relationship between superficial structures and deep seismogenic faults, with implication for the seismic hazard evaluation and related applications (e.g. capable faults characterization) along the axial zone of the central Apennines.
References:
Aringoli, D., Farabollini, P., Giacopetti, M., Materazzi, M., Paggi, S., Pambianchi, G., Pierantoni, P.P., Pistolesi, E., Pitts, A., Tondi, E. (2016). The August 24th 2016 Accumoli earthquake: surface faulting and Deep-Seated Gravitational Slope Deformation (DSGSD) in the Monte Vettore area. Ann. Geophys., 59(5), http://dx.doi.org/10.4401/ag-7199.
OpenEMERGEO Working Group (2017). Surface ruptures following the 30 October 2016 Mw 6.5 Norcia earthquake, central Italy. Journal of Maps.
Pierantoni P.P., Deiana G. and Galdenzi S., (2013) Geological map of the Sibillini Mountains (Umbria- Marche Appennines, Italy). Italian Journal Geoscience.