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ABSTRACT BOOK

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Multidisciplinary approach for 3D fault geometry reconstruction: an example from Calabrian-Lucanian boundary in the Mt. Pollino area (Southern Apennines-Italy)

Cirillo D.*[1], Brozzetti F.[1], de Nardis R.[1], Lavecchia G.[1], Orecchio B.[2], Presti D.[2] & Totaro C.[2]

[1] CRUST, DiSPUTer - Università G. d'Annunzio, Chieti, Italy.
[2] Dipartimento di Scienze Matematiche e Informatiche, Scienze Fisiche e Scienze della Terra - Università di Messina, Italy.

Corresponding email: d.cirillo@unich.it

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We present a tridimensional model of a Quaternary and active normal faults system, located in the southern Apennines extensional belt (Brozzetti et al., 2017a, 2017b), reconstructed integrating field and seismological data.

The fault system is located in the Mt Pollino area which, from 2010 to 2014, was affected by long lasting seismic activity including three major events occurred in May 2012 (Mw 4.2), October 2012 (Mw 5.0) and June 2014 (Mw 4.0) and ~3000 other earthquakes with 1

The 3D geometry of the Seismogenic sources activated during the aforesaid sequence was reconstructed by integrating high quality earthquake locations with the surface geometry of the active faults defined, in the epicentral areas, through detailed structural and morpho-tectonic survey.

The 3D geometry of the faults at depth was constrained using high-resolution hypocenter distributions, after an accurate selection and re-location performed by HypoDD method.

The hypocenters were managed through the Move v.2018.2.1 PetEx software package and plotted on a closely spaced grid of sections, striking SW-NE, SE-NW, N-S and E-W, (half-width 2 km) that is oriented orthogonal, transversal and parallel to the elongation of the epicentral clusters. This spatial orientation is in fact the most useful to better highlight the seismogenic patches on the faults at depth.

Further, our multidisciplinary approach allowed to determine the geometry, the kinematics, the cross-cutting relationships and the slip rates of the inferred active fault segments within and near the epicentral area.

The reconstructed fault system is markedly asymmetrical, characterized by low-angle, E and NNE-dipping faults, and high-angle, SW- to WSW-dipping seismogenic antithetic faults.

The East-dipping faults, which include low-angle structures, are interpreted as synthetic to a basal detachment. The antithetic W-dipping faults, although less important in terms of long-term deformation, are however significant in controlling the Pollino 2010-2014 seismic activity.

Some of the detected faults were substantially unknown or were not considered active, thus their recognition is of considerable importance for the definition of the seismic hazard of the Calabria-Lucania border.

Brozzetti F., Cirillo D., de Nardis R., Cardinali M., Lavecchia G., Orecchio B., Presti D. & Totaro C. (2017) - Newly identified active faults in the Pollino seismic gap, southern Italy, and their seismotectonic significance. Journal Structural Geology, 94, 13-31.

Brozzetti F., Cirillo D., Liberi F., Piluso E., Faraca E., De Nardis R. & Lavecchia G. (2017) - Structural style of quaternary extension in the Crati valley (calabrian arc): Evidence in support of an east-dipping detachment fault. Italian Journal of Geosciences, 136, 434-453.