

New geological evidence of Quaternary and late Quaternary fault activity in the Norcia-Campi and L'Aquila-Paganica basin areas: seismotectonic and land use planning implications

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Abstract

Geological investigations on the recent activity of faults and on their intersection with the ground surface allow to obtain data useful for defining the geometric and kinematic characteristics of tectonic structures which can represent the manifestation of seismogenic sources. These characteristics permit to obtain, indeed, information that can be used to estimate the seismogenic potential associated to a given seismogenic fault or fault system and to estimate hazard associated to the possible occurrence of surface faulting along the fault trace.

The present contribution shows the results of new geological investigations carried out in the central Apennines, in the Abruzzi and Umbria regions, namely in the Norcia-Campi and Paganica-L'Aquila basins. of active and capable faults (ACF) in two case studies in the Central Apennines.

The first case study is located close to the village of Preci (PG), where geological investigations have been carried out (and are still ongoing) to verify the presence of an active and capable fault (ACF) in the area of the Sant'Eutizio Abbey, severely damaged by the 30 October 2016, Mw 6.5 seismic event, for retrofitting activities. The available geological literature defines the presence in the Campi-Preci area of a fault segment of the Norcia active fault system, responsible for the 2 February shock (Mw = 6.8) of the 1703 seismic sequence. However, the Quaternary activity of this fault segment has not been geologically demonstrated yet. The geological investigations performed in the Sant'Eutizio Abbey area allowed to find in some places the evidence of displacement of slope deposits along some strands of the fault segment. Future works will be focused to ascertain the presence of one of these fault strands in the area of the Sant'Eutizio Abbey. In terms of fault activity, these pieces of evidence can possibly improve the definition of the geometric and kinematics characteristics of the seismogenic source responsible for the 1703 seismic event.

The second case study is located in the area of Bagno, southwest of the L'Aquila town, where geological field investigations allowed to first identify an ACF located along the southern flank of the Aterno River valley. The fault trend is parallel to the major active Apennine normal faults and dips towards the NE. Chronological data of the colluvial units involved in the fault movements, obtained by means of radiocarbon dating, permitted the first identification of another ACF in the Paganica-L'Aquila basin area. The comparison between the information obtained in the present study with the geological knowledges concerning other active faults permits to improve the seismotectonic knowledge of this region.