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ABSTRACT BOOK

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COVER IMAGE:

Miramare Castle in Trieste (Italy) with mountains in background (Photo 7915319 © Jackallxxx | Dreamstime.com).

New paleoseismological constraints of late Holocene earthquakes along the Mt. Morrone fault (Sulmona basin, Abruzzi Apennines, Italy)

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One of the major active and seismogenic structures in the Central Apennines is the ca. 23km long Mt. Morrone normal fault system (Abruzzi region, Italy), considered one of the most relevant seismic gaps of the central Apennines both for the elapsed time after the last event (probably 2nd century AD) and the potential and associated maximum expected magnitude (Ceccaroni et al., 2009; Gori et al., 2011). In addition to the few data on its last activation in historical age, the data regarding its Holocene paleo-earthquake history are still very inaccurate. However, the surface expression of the tectonic structure indicates a fault system potentially responsible for large seismic events (Mw 6.5-7); thus, its seismic potential evaluation represents an important task for the earthquake probability assessment of the region. In this frame, we present the results from two paleoseismological trench sites across the fault bounding the Sulmona basin (close to Roccacasale village), affecting late Quaternary deposits. The 15m-long first trench extended from the bedrock fault plane towards the hanging wall block, crossing a near 1.5m-high scarp observed in the field and carved onto slope deposits. The 6m-long second trench was opened at the base of this scarp, 4 meters south of the former site. The stratigraphic sequences exposed on the trench walls are similar at both sites and have been divided into different units. They are composed of Upper Pleistocene stratified alluvial fan deposits locally topped by colluvial bodies and slope scree of Upper Pleistocene - Holocene age. The detailed mapping of the trench walls allowed us to recognize several surface rupture events involving the entire investigated wide fault zone. The most recent evidence of faulting was found at the fault zone affecting slope deposits almost coincident with the above-described scarp, where the faulting event caused the formation of large fissures filled with organic-rich sediments, identified on both trenches. Ages from organic material sampled into the fissures and at different levels in the stratigraphic sequences suggest the occurrence of at least two surface faulting events along this fault within the last 5.4-5.3 kyr BP. Based on the displaced stratigraphic sequence, we estimated a minimum cumulative vertical displacement of 140 cm and 100 cm for the two trenches and a fissure opening up to 60 cm caused by the two events. Based on the D/L vs. moment magnitude scaling law, the amount of the measured slip goes well with the hypothesis of activation of the entire fault system length and seismic 6.5-7 M events. Our results also agree with the ~2.4 kyr recurrence time interval determined from previous paleoseismological investigations on the northern portion of the fault (Galli et al., 2015). Further trace of probably ancient man activities along part of the slope was found emplaced at the south-westernmost sector of the second trench, alongside evidence of its displacement by the latest surface faulting events.

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