Solid Earth Discuss.,
doi:10.5194/se-2016-77-AC1, 2016

Solid Earth Discussions

Interactive comment on "Defining a Mid-Holocene earthquake through speleoseismological and independent data: constraints for the outer Central Apennines (Italy) seismotectonic framework" *by* Alessandra Di Domenica and Alberto Pizzi

Alessandra Di Domenica and Alberto Pizzi

a.didomenica@unich.it

Received and published: 27 July 2016

We are very grateful to Alessandro Maria Michetti (Reviewer) for the very useful comments that help to better discuss the results of our study. The results of the speleoseismological analysis conducted in this work can be robustly correlated with independent paleoseismological and geological data outside the cave. We found that the speleothem radiocarbon dating matches with coseismic faulting recorded along the Sulmona normal fault and with the occurrence of the Lettopalena rock avalanche.

The Sulmona normal fault, therefore, may represent the most likely causative structure for the identified Mid-Holocene paleoearthquake that caused the Lettopalena rock avalanche and the damages occurred in the Cavallone Cave. These large effects recorded in the southern Maiella area, however, may be explained by the occurrence of a M ïĄ¿ 7 earthquake due to the synchronous rupture of the Sulmona fault with other fault segment(s). Based on the distribution of the coseismic ground effects with respect to the Sulmona fault trace,we hypothesized that these fault segments should be located south of the Sulmona fault where a set of closely spaced, sub-parallel Quaternary normal faults are present (e.g., Vittori et al., 1995; Pizzi et al., 2010). Therefore we indicate the Palena and Western Porrara faults as one of the possible prosecutions of the Sulmona fault, closer to the southern Maiella area. As highlighted by the Reviewer, the activation of fault segments south of the Sulmona fault is further supported by paleoseismological (Frezzotti and Giraudi, 1989; Calderoni et al., 1990; Brunamonte et al., 1991; D'Addezio et al., 2001) and new 36Cl data (Tesson et al., 2016) along the Rotella-Aremogna fault system where both the 4700 yr BP and the 1700 yr BP earthquakes, already associated by Galli et al. (2015) to the Sulmona fault, have been recognized. These correlations suggest that M ïĄ¿ 7 earthquakes could be reasonably hypothesized considering a synchronous activation of the Sulmona fault together with one or more fault segments belonging to the Rotella-Aremogna fault system and/or the Palena and Western Porrara faults, for a maximum total length of about 40-50 km. The Maiella area, therefore, can record high damages in case of the synchronous rupture of the Sulmona fault with the Palena- Western Porrara fault system or the Rotella-Aremogna fault system. In the first case, although the fault rupture would have a shorter length (ca. 40 km), the Maiella Massif results much closer to the trace of the seismogenic source; in the second case, a very large earthquake can be produced after the activation of a 40-50 km long further seismogenic source.

Interactive comment on Solid Earth Discuss., doi:10.5194/se-2016-77, 2016.