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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Small sinkhole-like features in alluvial plains: the example of Paganico (Lucca Plain, Italy)" *by* M. Dell'Aringa et al.

Anonymous Referee #1

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The paper presents a study aimed at individuating the triggering and evolution mechanism of the Paganico micro-sinkholes, the cracking of the soils due to drying period is an important factor in the origin of these phenomena. The paper provides an accurate description of the micro-sinkholes in the study area and of the results carried out with a simple and clear structure. The topic is very interesting and contributes to improve the knowledge on the origin and factors of small sinkhole. The development mechanism originating micro-sinkholes in the Paganico area can give some interesting contribution in the study of these phenomena also in other geological contexts. Moreover, the paper presents in my opinion some weak points: 1) the geotechnical characteristics

of the involved materials are not well described except for the grain size. The Authors report the results obtained by Magazzini (1998) concerning the volume variations of the impermeable level and of the sandy silt of "Bellettone". The reference (Magazzini, 1998) is not easy to find and it is not clear how the volume variations (1-3 cm per meter in thickness, 3 and 12 cm m-1 in thickness) have been obtained. In the conclusion the Authors state that "further studies should be direct towards the analysis of the soil desiccation phenomena and the better geotechnical characterization of the involved materials"; nevertheless, is there any other information about the swelling/shrinking characteristics of the impermeable level and the sandy silt (index properties, degree of saturation, etc. . .) which can better describe and quantify the phenomenon of volume change? 2) The unconfined aquitard has a medium-low hydraulic conductivity: Does the value take into account the presence of shrinkage cracks? 3) In the first development mechanism (micro-sinkholes associated to water flow between aquitard and aquifer) additional explanation are necessary. The presence of water in the aquitard induces the soil volume increase, closing the cracks, this mechanism is also possible in the intermediate clayey horizon, then in this case it is always possible the hydraulic connection between aquitard and aquifer through the impermeable level?.

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