

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

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Received and published: 4 October 2013

The Authors are grateful to the Anonymous Referee #2 for his suggestions, which certainly stimulated the discussion and improve the manuscript. Nevertheless, as the researcher knows, not always the answers to complex phenomena may be definitive (“single, solid conclusion”). They often leave open other interpretations that, by knowledge evolution, provide more complete solutions and models. We are sorry if the Referee considered us as “confused”. We have tried to comprehend a phenomenon not particularly known and studied in literature, by means of some geological, hydrogeological and geotechnical information, and on-site surveys, reaching conclusions

C1359

consistent with data available. We think that this study may be the beginning of more complete surveys and widening, which may confirm or deny our present interpretation. The two supposed mechanisms are not alternative, but two models in order to explain the origin of micro-sinkholes in different conditions. Specific comments: 1) The water tables are different and characterized by different hydrodynamic regime. It is possible that during some periods in which the clayey horizon allows the hydraulic communication, there is a hydraulic equilibrium. However it probably lasts only a short time. We have tried to monitor the superficial water table by means of a Casagrande piezometer, but foolish ploughing activity destroyed it after a too short period. However, some results will be showed in the manuscript. 2) In our opinion, the silty clayey layer has a important role in originating micro-sinkholes as explained in the conclusive paragraph. In fact, it determines the presence of two water tables in some periods of the year. Fig. 15 shows a possible mechanism in formation of micro-sinkholes near ditches and not all the micro-sinkholes observed. This model was supposed on the basis of on-site observations and lithostratigraphic data. 3) Some people really attributed the tunnels to animals, but most of people (included us) which analyzed the phenomenon tend to exclude this possibility, having obtained informal opinions also by zoologists and biologists. In fact, the animals usually excavate sub-horizontal and lightly inclined tunnels, generally chaotic, while the tunnels analyzed are often characterized by symmetry; there are not signs of excrement. 4) Basing on on-site observations, we think that damage due to micro-sinkholes is little, involving only very old and little buildings, fencing walls, and so on. We will clarify this in the abstract. 5) For micro-sinkholes near to canals, we directly controlled the communication by means of a flexible rule. 6) We have no information about fine fraction in wells. The aquifer has high transmissivity and probably the fine sediment disperses. 7) The drawdown near the well field and the steep hydraulic gradient toward the drainage ditch are really similar conditions in the formation of conduits and micro-sinkholes. However we prefer separate them, because the mechanism which determine such conditions is different. 8) The manuscript will be revised by a technical English editor.

C1360

C1361