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The Sinkholes at "Piano dell'Acqua" (San Basile, Northern Calabria)

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Five sinkholes have recently been identified in the territory of San Basile (Northern Calabria, Southern Italy), in locality "Piano dell'Acqua". The sinkholes are located in a hilly setting, where the main landform is represented by a slight valley draining toward the east. The sinkholes are limited in size, with maximum diameter of 10 m, and maximum depth of 2.5 m. Two of them are elongated, whilst the remaining three are circular. The area where the sinkholes develop is characterized by Pliocene conglomerate and sand, likely dislocated by tectonic lines.
The sinkholes were initially examined by means of multi-temporal aerial photos, and the outcomes from this analysis were checked in the field through geological, structural and geomorphological surveys. At the same time, an historical analysis was started in order to collect and critically evaluate the existing information and testimonies about age of occurrence of the phenomena. At this aim, several interviews with local inhabitants were performed, and a number of archives scrutinized.
As a result, the study allowed to hypothesize that two sinkholes developed during the winter 2000-2001, with likely rapid formation. Two other cases probably originated during the 70's, as also suggested by the age of the vegetation hosted within the sinkholes. The last sinkhole, eventually, opened sometime between February 2001 and November 2007. According to the collected testimonies, a further phase of sinkhole development might have occurred in the first half of the past Century, but no field evidence of this older phase has been found so far.
Analysis of the seismic catalogues showed that no earthquake can be identified as possible trigger of any of the sinkholes at Piano dell'Acqua. Therefore, the origin of the studied phenomena should be related to sub-cutaneous erosion, within an area that is rich in groundwater (as also shown by the site name, meaning "Water Plain"). Local changes in the water table, both related to climate and man-induced activities, may have triggered the development of the sinkholes that can be classified as belonging to the "suffusion" or "dropout" types (depending on whether the surface materials are made of, respectively, cohesive or not cohesive deposits).