



A Multi - Disciplinary Approach Combining Geological, Geomorphological and Geophysical Data for Mapping the Susceptibility to Sinkholes

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The Salento region of southern Italy has a great number of active sinkholes, related to both natural and anthropogenic cavities. The presence of sinkholes is at the origin of several problems to the built-up environment, due to the increasing population growth and development pressures. In such a context, the detection of cavities, and therefore the assessment of the sinkhole hazard presents numerous difficulties. Multidisciplinary – approach, comprising geological, geomorphological and geophysical analyses, is therefore necessary to obtain comprehensive knowledge of the complex phenomena in karstic areas. Geophysical methods can also be of great help to identify and map the areas at higher risk of collapse. In this case it is important to identify the features related to the underground voids, likely evolving to sinkholes, by contrasts in physical properties such as density, electrical resistivity, and so on, with the surrounding sediments. At the same time, identification of the presence of sinkholes by geophysical methods has to adapt to the different geological conditions, so that there is not the possibility to use the same techniques everywhere.

At this aim, the present paper illustrates the advantages of integrating geological and geomorphological surveys with surface geophysical techniques such as seismic, geoelectrical and ground penetrating radar methods for the identification of sinkhole-prone areas. The present work illustrates the results concerning a sinkhole system at Nociglia (inland Salento, southeastern Italy) where the shallow phreatic speleogenesis operates close to the water table level with formation of karst conduits and proto-caves whose evolution occurs through successive roof collapse, formation of wide caverns and sinkhole development at the surface. All of this creates serious problems to the nearby infrastructures, including a province road that has often been threatened by the sinkhole development.

Geological and geomorphological analyses provided the basic data necessary to constitute a framework to understand the mechanism of sinkholes formation and at the same time to guide the choice of the most suitable geophysical techniques, and the interpretation of the measurements as well. The different geophysical methods are eventually discussed in order to point out their ability to locate the main karst conduits and caves.