



Ground penetrating radar surveys in a karst area for identification of geomorphological hazards

Stefano Margiotta (1), Sergio Negri (1), and Mario Parise (2)

(1) university of salento, Lecce, Italy (sergio.negri@unisalento.it), (2) University of Bari, Bari, Italy (m.parise@uniba.it)

Many coastal areas along the apulian coastlines (SE Italy) are intensely affected by sinkhole problems, which periodically cause damage to the main infrastructures, including the coastal roads and sparse settlements. Torre Castiglione is a locality situated at the boundary between the provinces of Lecce and Taranto, on the Jonian sea. Several sinkholes have in time affected the province road 340, which is a very important communication route during the summer, due to the tourist vocation of the area. Proximity of the site to the sea results in the mixing between sea water and fresh water, which determines a higher aggressivity toward the carbonate rock mass, and development of karst features and landforms, including caves. Due to the above reasons, the whole coastal sector is classified as with high geomorphological hazard.

Aimed at investigating such hazard, a variety of direct and indirect surveys have been performed in the last years. Geological surveys, carried out through detailed field surveys, highlighted the presence of multi-storey cave systems, which upward stoping might eventually produce the formation of sinkholes. As concerns geomorphology, the population of identified sinkholes (more than 50) has been morphometrically characterized by measuring their depth, length, and width.

The present contribution focuses on the geophysical surveys performed in the area. In detail, Ground Penetrating Radar (GPR) surveys have been carried out, due to the good resolution and the high penetration of the electromagnetic signal in geological settings characterized by presence of carbonate rocks. However, the presence of a karst aquifer in the area causes problems in the absorbing capacity of the signal. The main goal of this study is the analysis of the subsoil, aimed at testing the capability of GPR in a karst setting. A GSSI instrument was used, with antennae of 400 MHz, 200MHz and 100 MHz. The surveys were addressed to evaluate the capability of the method in such a setting, and to verify the velocity of propagation of the electromagnetic waves. Some scanlines were addressed to investigate, in particular, a sinkhole crossing the province road 340, by carrying out GPR profiles with a 200 MHz antenna at 90ns and 120 ns. The signal appeared to penetrate the subsoil at velocity of about 8 cm/ns. Elaboration of the data pointed out a series of cavities along the rural road running parallel to province road 340. In addition, the GPR survey highlighted the presence of complex karst systems at different depths, with cave size on the order of some tens of meters. A likely alignment in the cave direction seems to be shown, too.