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Karstic risk assessment in a coastal area using microgravimetric and Ground-penetrating radar geophysical methods;

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The geomorphological characteristics of the Salento peninsula (Puglia, south-eastern Italy) mean that movements of mass are extremely rare. These phenomena particularly affect certain coastal zones characterized by cliffs in rapid retreat and some unusual points in the hinterland in which collapses, generally linked to the development of karstic cavities, are common. These phenomena demonstrate the brittleness of some areas of the Salento and they constitute a restraint on the use of the territory itself. The coastal area named “Marina di Capilungo” located at about 50km south-west part of Lecce (Salento peninsula – Italy) is one of the sites at greatest geological risk in the Salento peninsula.
In the last few decades, “Marina di Capilungo” has been affected by a series of subsidence events, which have, in some cases, resulted in the partial collapse of buildings and road surfaces. These events have had both social repercussions, causing alarm and emergency situations, and economic repercussions in terms of the expense of restoration.
With the purpose of estimating the dimensions of the phenomenon to prevent and/or to limit the ground subsidence events, integrated geophysical surveys were undertaken in an area of about 70000m2 at “Marina di Capilungo”.
Microgravimetric and ground-penetrating radar (GPR) geophysical methods were used. By using small station spacing and careful processing for the geophysical data, and by modelling these data with topographic information, accurate interpretation was obtained. Combining the two geophysical methods help in the interpretation. In fact GPR method can be complement microgravimetric method in determining cavity depths and in verifying the presence of off-line features and numerous areas of small cavities which may be difficult to resolve in microgravimetric data; on the other hand the microgravimetry can complement GPR method for accurately delineating a shallow cavities in a wide area where GPR measurements are difficult to perform.
The case study show how the recorded microgravity anomalies have revealed, with the help of GPR recorded anomalies, the location of density variations associated with underground cave systems.