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Abstract title

MICROGRAVITY PROSPECTING IN ORDER TO RESEARCH SINKHOLES RISK AREAS

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Abstract

Recently many sinkholes have been formed in some peculiar areas of the Central Italy.

Although the causes of sinkholes genesis are enough known, the collapse mechanisms and the original cavity depth and geometry are not recognized.

Actually, sinkholes risk areas are located in Tuscany, Latium and Abruzzi. Numerous researches carried out on recent formation of two sinkholes in Tuscany show that the one formed in a residential area of Camaiore plain (Lu), causing the destruction of many houses, and the one formed in Bottegone (Gr) show some common characteristics between them: a great depth of the substratum, a linkage between sinkholes and active faults of the substratum and a confined thick water table in the carbonate substratum. This bedrock is buried by thick alluvial successions. The geological reconstruction attributes the disastrous event to a deep collapse in the carbonate bedrock.

In Latium, San Vittorino plain (situated on the east side of Rieti town) and Doganella di Ninfa-Lt. (situated on Pontine plain, below the Lepini Mt), display peculiar characteristics for the sinkhole formation. In these areas sinkhole genesis is due to a great depth of the fractured carbonate bedrock, which presents karst processes and active faults, the presence of an aquifer developed close to the surface and the mixing processes between meteoric filtering waters coming from the Lepini Mt and H₂S-rich waters.

Near Rome below Lucretili Mt, the Marcellina sinkhole have been formed in Olocene lacustrine sediments; some older ones could be present ("Il Laghetto" area) and some new would form in the surrounding area.

Sinkholes' genesis can occur for dissolution of an evaporitic and/or carbonate bedrock, which presents karstic processes and active faults, overlapping recent fluvial-lacustrine, lagoon and marine sediments (and/or alluvial deposits with sand, clay, mud, volcanic and ashy levels, travertine alternations), the presence of a great underground water flow with its physico-chemical properties, ascending liquids and gases, tectonic faults and anthropic causes such as mining activity that can develop fastest phenomena, i.e. Saline di Volterra (Pi) and Belvedere Spinello (Cz).

Although sinkholes formation could result from various factors, independent or not among them, the collapse of overlapping sediments is due to lack of rocks below them. For this reason microgravity prospecting has been applied in order to identify the sinkholes risk areas and we present some application of this geophysical methodology.

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