



Sinkholes hazard in Italy: first results on the inventory and analysis of some case studies.

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Sinkholes in Italy occur widespread and have been recognized since a long time. Since the Roman age historical information demonstrate the presence of catastrophic collapses which in some cases could be re-activated with a frequency of hundred years. During the quiescent period most of these collapses can be masked by natural or artificial filling of the cavity. This is often the cause, together with the long time between the events, of loss of attention on this hazard.

In this study more than 200 cases have been analyzed and results provide a clear definition of the geological, structural, hydrogeological and geochemical scenario of the sinkhole prone areas.

Sinkholes in Italy are generally formed by pressurized aquifers located in areas having deep basement rocks overlain by various types of unconsolidated sediments (more than 150 meters of clay-silt and sand-silt) and the occurrence of various faults or fracture systems.

They are primarily concentrated along the Tyrrhenian margin (Latium, Abruzzo, Campania and Tuscany regions), as well as in some intermontane tectonic plains, in the immediate vicinity of carbonate ridges or in complex geological-structural and hydrogeological settings. In these areas the presence of regional active faults acting as route for acidic gases (i.e. CO₂ and H₂S) migration which dissolve and/or pass into the groundwater and make it more aggressive, has been recognized in many cases. Other phenomena have been recognized in Molise, Liguria, Sardinia and Sicily. In particular sinkhole in Sicily end in Puglia are mainly characterized by the presence of permeable covers overlying evaporitic sediments (i.e. gypsum). The Periadriatic margin, with the

exception of some cases in the Puglia region, does not seem to be a sinkhole prone area.

In the sinkhole prone areas both natural and artificial triggering processes such as seismic activity, flooding or anthropic activities may cause quick and catastrophic collapses. Results highlight that about 16% of the analyzed cases are linked to a seismic event occurred few days before.

Data obtained from the literature and field measurements highlight a wide range of diameter values (from few meters up to more than 200) and depth (from few meters up to 50), but the majority of the cavities show small diameters and depth, and are water filled. The sedimentary cover is mainly silty-clay and sands with some travertine lenses.

The bedrock occur at a depth of more than one hundred meters, and very different from the shallow depth occurring in other European countries and USA.

The study of several cases suggests some hypothesis about the genetic mechanism and the triggering causes of the sinkholes in Italy. In this work a first attempt of sinkholes typology and classification is proposed.