



## **Hydro-geological Instability Events hazard assessment in Napoli municipality.**

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A methodological approach for the hazard assessment of Hydrogeological Instability Events (HIEs) in Napoli municipality area is proposed. This methodology, mainly based on HIEs historical archive and on statistical analysis of possible factors (geological, geotechnical, and climate data) triggering the HIEs, has been focused on the following main topics:

- analysis and classification of HIEs, occurring between 1986 - 2001;
- implementation of Geocity database with new environmental data;
- statistical analysis of possible natural and anthropic factors triggering HIEs more frequent in the first 5 meters depth from the surface: hollow and sinking (HS), deep hollow-deep sinking (DH, DS) and instability events concerning supporting wall (IEW).
- performing thematic maps showing the features of each potential triggering factor: geotechnical zoning based on Cone Penetration Test (CPT), drill holes density map; CPT density map; hydrogeological instability events density map, distribution and frequency map of the main stratigraphic units found in the first 5 m depth from the surface;
- performing the hazard map through the use of GIS software;

The statistical analysis of HS, DHS and IEW has shown: a) a negligible contribution of the lithologic unit as a suitable parameter to detect the distribution of the HIEs,

due to the frequent occurrence of ARM unit, in the first 5 meters depth; b) a negligible difference between the mechanical terrain features, in fact, the results of CPT, realized in the first 5 meters-depth, have shown a mean resistance value  $q_c$  quite variable; c) an IEW increase in correspondence of intense rainfall; and a short term increase of HS and DHS in case of events like that occurred in October and November 1987 (characterized by 450 mm of rainfall in about one month) and also on 15 September 2001 (characterized by 130 mm of rainfall in few hours); an extended increase of HS and DHS in case of events like that occurred in September 1996 and January 1997 (characterized by 1000 mm of rainfall in about five month); d) the HS and DHS are more frequent in the area characterized by the coexistence of white and dark water net or by the presence of pluvial net unable to carry the rainfall volume.

The IEWs (representing about 10% of total instability events) have the same relation of HS and DHS with the city sewer system but their distribution is mainly influenced by the presence of unwelded pyroclastic deposits and medium-high slopes.