



## **An investigation on perviousness of red soil of Apulian karst areas – Southern Italy**

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The influence of red soils coverings on hydraulic and hydro-geologic vulnerability in Murgia area and piedmont was here investigated.

Red soil samples used for the tests come from the most superficial layers of Murgia area in Taranto and Bari districts. As far as known by literature, red soils have a mineralogical composition characterized mainly by the presence of quartz and secondly by iron minerals and sand. Within the finer fraction chaolinite is largely prevalent over the other minerals, such as goethite, often remarkably present, iron oxide (ematite and magnetite) and illite.

The capacity of rain waters to infiltrate through red soil depends on both soil permeability and rainfall intensity. Whereas permeability, i.e. infiltration rate, is lower than rainfall intensity, backwater pounding will take place. The present study has shown that in-situ hydraulic conductivity can remarkably vary on a quite wide range as a function of the initial water content and therefore it can condition significantly the permeability of outcropping calcareous formations. As a consequence, infiltration and superficial runoff phenomena can be largely influenced.

Within the present study 33 permeability tests have been performed: 19 of them carried out during winter time characterized by continuous and prolonged rainfalls and 14 during the spring season, relatively dryer. A Guelph permeameter was used for in situ permeability tests.

During the wet period the soil permeability resulted very low. During spring, permeability values measured resulted much higher. Therefore the overall set of performed tests pointed out how permeability of red soils is largely influenced by the initial water content. Permeability values may distinctly vary more than one order of magnitude as a function of initial water content. The process leading to permeability variation derives from hydration phenomena and is very slow. At low permeability values stationary flux conditions can be reached before hydration of the soil is complete.

Permeability tests performed in laboratory have confirmed in situ evidences, producing the same results and showing low permeability of sampled soils. The permeability variation undergone by the wetting red soils is due to the slow hydration and bulking of clay and iron minerals, that gradually tend to limit all inter-clastic voids and therefore reduce gravific water mobility. In particular, as the amount of swelling mineral is low, the role of goethite should be determinant, since it is an iron mineral characterized by a structure similar to clay minerals.