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Hydrologic role of vegetation in the stability of shallow soil cover. A case study.

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In this paper interaction between the subsoil and the atmosphere and the role of vegetation on this phenomenon have been analysed, to predict soil water content and suction regime in the subsoil, as a function of meteoric and climate factors. A wide experimentation has been carried out on site in a trial field, where pyroclastic soils cover the limestone substratum. Suction has been measured by tensiometers under high chestnut trees and where they are recently cut, to obtain firewood.

Important differences in soil water content have been detected during dry seasons when evapo-transpiration is strong for climatic factors (high temperature and direct solar radiation on soil surface) and the presence of leaves on the branches of the plants. During humid seasons suction under trees decreases and assumes more or less the same values acting in zones where vegetation is absent or has been cut.

This phenomenon has been analyzed according to models by Blight (1997) and Wilson et al (1994). In the soil domain Darcy and Fick's laws are used to describe the flows of liquid and vapour water respectively and calculate changes in water content and temperature profiles with time. Penman's equation has been used to evaluate the potential evapo-transpiration. Analysis is based on a wide experimental investigation: soil water content and hydraulic conductivity have been measured through laboratory tests: soil water content has been well defined as a function of soil suction and permeability has been indirectly obtained form evaporation tests.

To simulate field conditions, climatic data were used to calculate the volumetric water content and temperature profiles in the soil.