



## **Measurement of wet-range water retention on porous rock**

**M.C. Caputo**, F. De Benedictis, M. Vurro

Water Research Institute, IRSA -CNR, Italy, Bari, via F. De Blasio, 5, 70123,  
(caputo@area.ba.cnr.it / fax: +39 -080- 5313365 / phone: +39-080-5820536)

The understanding of the unsaturated flow and transport processes is essential in evaluating groundwater recharge and in predicting the transport of pollutants in the vadose zone. A thick unsaturated zone often includes layers of rocks beyond the shallow layer of the agrarian soil. Much research of unsaturated zone hydrology has been conducted in humid sites characterized by thin vadose zone mainly constituted from agrarian soil only. However, fundamental differences between humid and arid regions limit the applicability of the techniques developed at thin sections of vadose zone to the thick one constituted from rocks also. We tested the applicability of a laboratory methodology developed for soils to determine the water retention of a consolidated porous rock. The used suction table method allows water retention characteristics to be measured from saturation to a minimum matric head of about - 1.0 m. Core samples of calcarenite, a sedimentary rock of marine origin that often constitutes a thick layer of the vadose zone, have been used for the test. Hydraulic characterization of this rock is for saturated conditions only. The samples, with their sides properly isolated with resin in order to have unidirectional flow and to prevent preferential flow between the sample and the resin, were placed on a porous barrier subjected to suction. A series of static equilibria is established and at each of them the volumetric water content and the related matric head are determined. These pairs of measured values represents different points of the water retention curve. The obtained data agree well with the retention curves obtained with different methods. The method, even if it needs long experimental time, works well for the rock samples and gives good results close to the saturation allowing to determine the air-entry value with higher accuracy than other method.