TWO DIMENSIONAL WATER TRANSPORT IN A HILLSLOPE IN NORTHERN GERMANY

José Dörner[1,2] and Rainer Horn[1]

[1.] Institute of Soil Science and Plant Nutrition, Kiel University. Herrmann-Rodewald-Straße 2, Kiel, Alemania. (rhorn@soils.uni-kiel.de)
[2.] Instituto de Ingeniería Agraria y Suelos, Facultad de Ciencias Agrarias, Universidad Austral de Chile, Casilla 567, Valdivia, Chile. (jodofe@gmx.de).

SUMMARY

The knowledge about the capability of porous media to transmit fluids is important to determine the transport of water and nutrients in soils. In water flow simulations is normally assumed that the hydraulic conductivity is isotropic, i.e. the hydraulic conductivity don't change with the sampling direction. This assumption differs with the results presented by several authors. Therefore the aim of this work is to show some results about the anisotropic behaviour of hydraulics properties, as well as, the effect of the anisotropy of the saturated water conductivity on the water flow in a hillslope in Northern Germany. Tensiometers were used to measure the matric potential at different depths in 3 sites of one soil catena. Vertical and horizontal undisturbed soil samples were collected from the soil horizons at the three sites. The water retention curve (WRC), the saturated water conductivity (ks) and the air permeability (ka) were measured. The van Genuchten parameters were derived with RETC v 6.0. The two-dimensional water flow was modelled with Hydrus 2D v. 2.101. The observed matric potential data were used to estimate the goodness of the fitting. The anisotropy of the saturated hydraulic conductivity and air permeability was confirmed at the scale of soil horizons. The anisotropy of this pore functions depends on the continuity of the porous media and is related to the orientation of the soil aggregates. Due to the anisotropy, the water flow was deviated in the direction of the higher ks (horizontal) and lateral flow took place. In this case, the consideration of anisotropy of the saturated hydraulic conductivity improved the modelling of the water flow in the hillslope.

KEY WORDS: porous system, hydraulic conductivity, water flow, anisotropy