MODELLING OF WATER INFILTRATION AND SOIL SWELLING IN A VERTISOL FROM GUADELOUPE.

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Models of water infiltration in undisturbed swelling soils rely on a dual porosity concept: Darcy flow in the micro (matric) porosity and by-pass flow in cracks. In vertisols from the humid tropics, a third component must be added: the structural porosity, excluding cracks, formed by the soil microfauna activity and containing water easily available for plants. A model was implemented to study the mecanisms of water infiltration: (i) water infiltration in the matric porosity is modelled by the Darcy law, (ii) the flow in the structural porosity is a gravity-dominated flow, (iii) water entering cracks is instantaneously added at the bottom of the cracks. Water movement from structural to matric porosity and from crack's wall into soil matrix are accounted for. Cracks opening is a function of soil matrix moisture. Shrinkage curve, retention curve and hydraulic conductivity of the matrix were measured in the laboratory. The anisotropy ratio of soil deformation was measured *in situ*. Experiments were conducted *in situ* to fit some soil structure parameters and test the model. Although not wholly validated because of a poor modelling of infiltration in structural porosity, the model already shows that infiltration in this soil is a 3D process and that water infiltration in structural porosity is the main factor of rainfall partition between vertical infiltration in the soil matrix and water flow into the cracks. Therefore, new researches should focus on water flow in structural porosity.