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The role of the organic matter in the soil water retention: some recent laboratory experiences

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The role of the organic matter in increasing the retention capabilities of a soil has been widely investigated in recent years. A number of empirical pedotransfer functions has been proposed as well in order to link the effect of the organic matter content x_o to the soil water retention relationship $\Psi(w)$. Here some recent laboratory experiences, performed with the aim of better understanding such effects, are discussed and interpreted with a simple quasi-predictive model. Using three almost inorganic soils characterised by significantly different texture, several soil samples with a fixed organic matter content have been reconstructed with known quantities of peat. Then the experimental $\Psi(w)$ relationships and the actual x_o were measured with high pressure and low pressure Richards' apparati and a muffle fournace. The retention experimental data were compared and interpreted with some common relationships in the hydrological practice. The empirical dependency found between the $\Psi(w)$ relationships' parameters and x_o are in good agreement with analogous relationships we recently found after investigating some real soil samples collected during field campaigns. Finally, a simple model based on the hypothesis that an organic soil behaves as a mixture of two dinstict porous media (the organic matter and the inorganic soil grains) is presented and its capability to describe experimental results is discussed. Keeping into account of the experimental uncertainities due to the eterogeneities of the organic matter, the proposed model proved to be fairly reliable for predicting the $\Psi(w)$ relationships once known the hydraulic properties of the two components.