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Soil structure as a source of preferential flow

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Soil structure expressed in pore geometry is a key factor predestinating the flow and transport processes in soil profile. The initiation and propagation of the structure related preferential flow belongs to the hottest topics. Results of long term experimental work, carried out to visualize the porosity and/or soil moisture distribution, and to trace the actual movement of water within the soil sample or in the field, will be presented. Focusing on the structure of real soils, valuable information on the formation of preferential flow, its stability in time and the possibility of quantification in different soil materials, has been obtained. In selected classes of soils, the influence of structure is often coupled with the impact of the air phase distribution, strongly related to the initial soil moisture distribution. In such cases, the flow instability accompanies the preferential flow effects. Some of the presented findings address the question of how to overcome the effects of Ďsmearing", unavoidable in the standard determination of soil hydraulic characteristics, for numerical modeling purposes.