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Converging hydrostatic and hydromechanic concepts of preferential flow definitions

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The boundary between preferential flow and Richards-type flow is *a priori* set at a volumetric soil water content θ* at which diffusivity *D* (θ*) = η (=10^{-6} m^2 s^{-1}), where η is kinematic viscosity. First we estimated with a hydrostatic approach from soil water retention curves the boundary, θ^K, between the structural pore domain, in which preferential flow occurs, and the matrix pore domain, in which Richards-type flow occurs. We then compared θ^K with θ* that was derived from the respective soil hydrological property functions of same soil sample. Second, from *in-situ* investigations we determined 96 values of θ^G as the terminal soil water contents that established themselves when the corresponding water-content waves of preferential flow have practically ceased. We compared the frequency distribution of θ^G with the one of θ* that was calculated from the respective soil hydrological property functions of 32 soil samples that were determined with pressure plate apparatuses in the laboratory. There is support of the notion that $\theta^K \approx \theta^G \approx \theta$*, thus indicating the potential of θ* to explain more generally what constitutes preferential flow. However, the support is assessed as working hypothesis on which to base further research rather than a procedure to a clear-cut identification of preferential flow and associated flow paths.

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