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Fluid Flow in Porous Media for Soil-Water Retention CESARE MIKHAIL CEJAS, BERTRAND SELVA, RAPHAEL BEAUFRET, LARRY HOUGH, CNRS COMPASS UMI 3254, CHRISTIAN FRETIGNY, ESPCI, REMI DREYFUS, CNRS COMPASS UMI 3254, CNRS / RHODIA / UPENN UMI 3254 TEAM — The study aims to understand the mechanisms that determine the behavior of water in soil. In developing a better comprehension of the coupling between the various fluxes (e.g. evaporation, drainage) in soil and the surrounding environment, we elaborate strategies that permit to understand and improve particularly the water absorption by the roots. Our first approach, through direct visualization, focuses on evaporation out of a 2D model soil consisting of monolayer glass beads. Evaporation from porous media exhibits an abrupt transition from capillary-supported regime 1 to diffusion-controlled regime 2. Varying the wettability of the model soil suggests that the duration of regime 1evaporation and drying front formation in hydrophobic media are shorter than in hydrophilic media due to the absence of hydraulic continuity towards the evaporating surface. We then study how evaporation couples in the presence of roots in the model soil while being subjected to various treatment conditions (e.g. physical additives, etc.). Through this study, we would be able to quantify how the physico-chemical soil treatments affect these phenomena and inspire solutions for improving soil water retention.

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