

Abstract Submitted
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Simple analytical model of evapotranspiration in the presence of roots CESARE CEJAS, Laboratoire Microfluidique, MEMS, Nanostructures (MMN), ESPCI, Paris, JEAN-CHRISTOPHE CASTAING, Solvay Research and Innovation Centre-Aubervilliers, LARRY HOUGH, CNRS Complex Assemblies of Soft Matter COMPASS (UMI3254), CHRISTIAN FRETIGNY, CNRS Sciences et Ingénierie de la Matière Molle (SIMM) UMR7615, REMI DREYFUS, CNRS Complex Assemblies of Soft Matter COMPASS (UMI3254), COMPASS TEAM — Water is essential for plant growth. The loss of water via evaporation in soil remains to be an important limiting factor for root growth and consists of well-debated mechanisms. The presence of a plant also provides an additional pathway for water transport in the form of transpiration. Prediction of total evapotranspiration flux permits estimation of the remaining quantity of water in the soil. Using a controlled visual 2D model set-up, we perform evaporation experiments with real root systems under different relative humidity conditions. We use the results on mass loss and evaporation front positions to develop a simple model, based on basic principles of evaporation flux, which predicts the position of the evaporating front and the total mass of water that is lost from the evapotranspiration of water out of the granular medium. The model also helps predict the lifetime of the plant – an important application in agriculture.

Cesare Cejas
Laboratoire Microfluidique, MEMS, Nanostructures (MMN), ESPCI, Paris

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