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Novel Evaporation Experiment to estimate Soil Hydraulic Properties

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Hydraulic properties are essential for modelling soils. It is common practice to parameterize them based on multistep-outflow experiments in the wet range, but to also use them in the dry range. However, such an extrapolation is only permissible for rather coarse-textured soils. As an alternative, we developed a novel evaporation experiment which yields reliable data for parameterizations in the dry range and bypasses common problems of traditional evaporation experiments. For the first time, the setup allows controlling the evaporation boundary condition. Employing infrared absorption spectroscopy, we determine both the water flux and the water potential at the upper boundary with high precision even in the dry range. This allows us to abandon balance and tensiometers, the main causes of difficulties in traditional evaporation experiments. Soil hydraulic properties are determined by numerical inversion that takes the diffusive boundary layer into account explicitly.