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Numerical study of different bottom boundary conditions on water flow in lysimeters

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The separation of the bottom of the lysimeter from its surroundings in the field introduces an artificial boundary that may impact the water balance of lysimeters. The use of tension controlled lysimeter (TCL) prevents an artificial boundary at the end of the lysimeter. Water flow across the lysimeter bottom can be controlled by the adjustment of matric potentials at the lower end of the lysimeter to measured field conditions in the close vicinity of the facility. However lysimeters are often transferred from the place where the soil monoliths were sampled to another location for practical reasons or to study the effect of climate change (e.g. SOILCan). The water flux across the bottom boundary of translocated TCL can be affected if climatic conditions, soil properties and the hydrogeological setting in the field differ from the place where the lysimeter was taken from. To assess the potential impact of different bottom boundary conditions on the water balance of translocated TCL a numerical study in virtual soils was conducted. We present a comparison of different approaches using water balance simulations. Results shows that water balance components of translocated TCL are sensitive towards the soil hydraulic parameters and hydrogeological setting in the field. The change in field conditions can impact the water flux dynamic across the lysimeter bottom, change the evaporation and the plant water uptake and release. A shift in the climate regime (translocation) will modify the depth and dynamics of the water table and impact the water balance of lysimeters.