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# Temperature transport in Lysimeters – comparison of different setups

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Lysimeter studies are designed to mimick the undisturbed soil for the study of soil processes. Ecological and chemical processes are influenced by temperature and therefore it is mandatory that the temperature regime in the lysimeter follows closely the natural conditions. Unfortunately the lysimeter has a lower boundary that cuts off the natural dampening temperature flux. Also the walls of the vessel can transport temperature in a higher rate than the soil would do. And the exchange with the surrounding air at the installation facility may add a bias to the temperature regime in the lysimeter vessels.
To test the influence of the wall and the lower boundary we have set up a lysimeter experiment with three different lysimeters. These are all $1m^2$ surface by 2 m depth vessels, identically filled with a sandy loam. All three were instrumented with temperature sensors in 4 depths, and at each depth with 4 sensors, with a distance of 2,5 cm; 5 cm; 10 cm and 15 cm from the wall. In addition, temperature sensors in the surrounding soil and air temperature in the lysimeter containment are available.
The three vessels differ in their setup and material. One vessel is a standard stainless steel vessel with seepage boundary, the second is stainless steel with isolation and a controlled lower boundary. This vessel has a tube system at the bottom that circulates water in the vessel and the surrounding soil at the same depth. The control ascertains that the bottom temperature of the lysimeter vessel is always the same as in the surrounding soil. The third vessel is made of PE, in order to minimize temperature transport in the wall material.
The data so far shows little difference between the alternative setup. It seems that in a well closed lysimeter containment the temperature regime is sufficiently close to the natural soil. This is especially true for the top soil where most biological and chemical processes occur.