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Control of environmental conditions at the lower boundary of field lysimeters

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Lysimeters are vessels containing disturbed or undisturbed soil, embedded completely in soil with its top even to the soil surface. At the bottom of lysimeters, the soil is cut off from the parent soil, and the lower boundary of lysimeters is usually exposed to atmospheric pressure. For this reason, soil water conditions may be different than of the surrounding soil. This may affect the soil-water conditions throughout the soil profile in comparison to the surrounding soil. To avoid this problem, lysimeters with a construction depth much more than the expected rooting depth should be used or a suction-controlled drainage system needs to be installed at the bottom of lysimeters. Not only the water flow but also the heat flow in the lysimeter is affected by the isolation of the soil and by the fact that the soil at the bottom of the lysimeter is cut off from the surrounding area. However, since now only a few studies have dealt with this issue. This is surprising because the soil thermal regime controls both growth and function of roots and shoots. Therefore, a new design for an automatic control of soil temperature at the lower boundary of large, undisturbed field lysimeters was developed. The objective of the intended talk is to present and evaluate the design and functionality of this new setup.