

# Characterizing water transport in lysimeters with stable water isotopes

## Motivation:

Stable water isotopes combined with modeling can be used to characterize water flow in the subsurface. This thesis builds upon studies that have been done at a lysimeter site (in cooperation with the Bavarian Environmental Agency, LfU). The lysimeters contain different soils, and experiments are carried out with pollutants in order to investigate potential pollutant discharge to groundwater.

This thesis will contribute to ongoing investigations, for looking at a longer time frame and at another soil core. You will be involved in evaluating stable water isotopes, simulating water transport and obtaining findings on water availability and transport in the unsaturated zone of the soil cores. Baseline questions include:

*How is the long-term development of water retention in the unsaturated zone?*

*Which influence can be seen by the different processes, including leaching, evaporation & plant uptake?*

*What is the impact of dry subsurface conditions that prevailed in recent years? (climate change)*

## Description:

- Measurement and interpretation of stable water isotopes in the unsaturated zone
- Model-based evaluation of water retention and flow (optionally: numerical modelling with HYDRUS-1D)
- Interpretation also with respect to climate change

## Requirements:

- Interest in hydrogeological questions and modeling (Excel; optionally Matlab, Python, HYDRUS-1D)
- Basic knowledge in hydrogeology and biogeochemistry
- Motivation to work independently with data analysis and models

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