

Investigating the Transpiration Process Dynamics from Plant Scale to Plot Scale in a Cropland with High Resolution Measurements

The soil-plant-atmosphere continuum (SPAC) is the backbone of terrestrial ecosystem processes, controlling water fluxes and carbon cycling essential for plant growth, groundwater recharge, and sustainable agricultural productivity. However, the lack of high-resolution data limits current understanding of SPAC dynamics. Existing studies often bypass the small-scale, short-term plant plasticity and feedback that influence critical processes such as **evapotranspiration (ET)**, **transpiration (T)** and soil water redistribution.

In this thesis project, **transpiration (T)** will be measured using **plant chambers (n=3)** equipped with sensors to monitor solar radiation and relative humidity at the plant scale. These chambers will be coupled with **stable water isotope** and gas concentration analyzers, soil water isotope probes, and **soil moisture** sensors, allowing for comprehensive data collection from the **root zone** to the top of the canopy.

The measurements will be conducted at the experimental farm Reinshof, Göttingen, within the footprint of an eddy covariance tower in the growing season 2025, starting from mid-February. Chamber measurements will be semi-automated under rain-free conditions at least three times per week, while other measurements will be performed continuously. The resulting dataset will provide high temporal and spatial resolution, allowing detailed insights into dynamic SPAC interactions and their integration into larger spatio-temporal scales.

This master's thesis is part of a collaborative project (ISOSCALE) between the Leibniz Centre for Agricultural Landscape Research (ZALF) and the University of Göttingen. Applicants will have the opportunity to contribute to cutting-edge research and could receive a **HiWi contract** (min 20 h per month) for field measurements.

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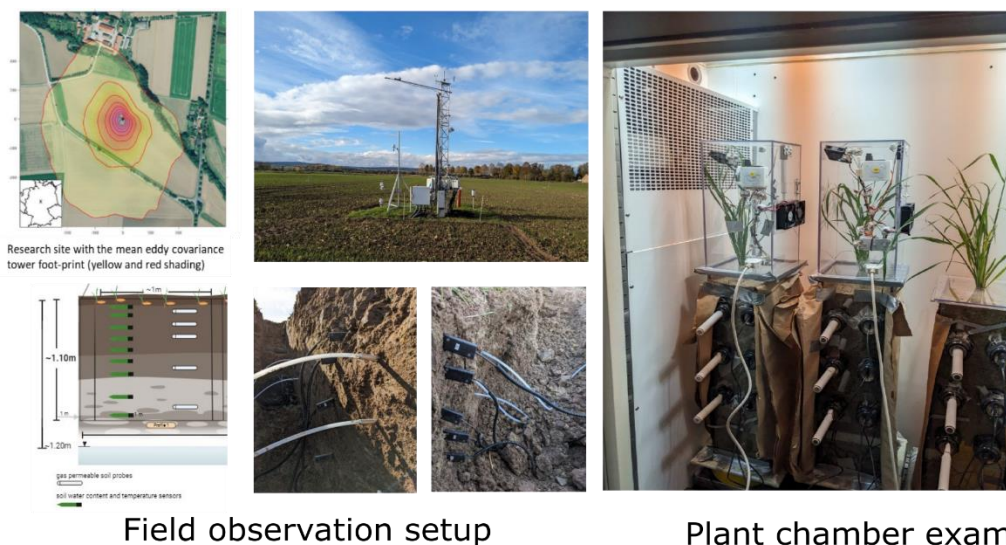


Figure 1 Field setup and plant chamber example for this project