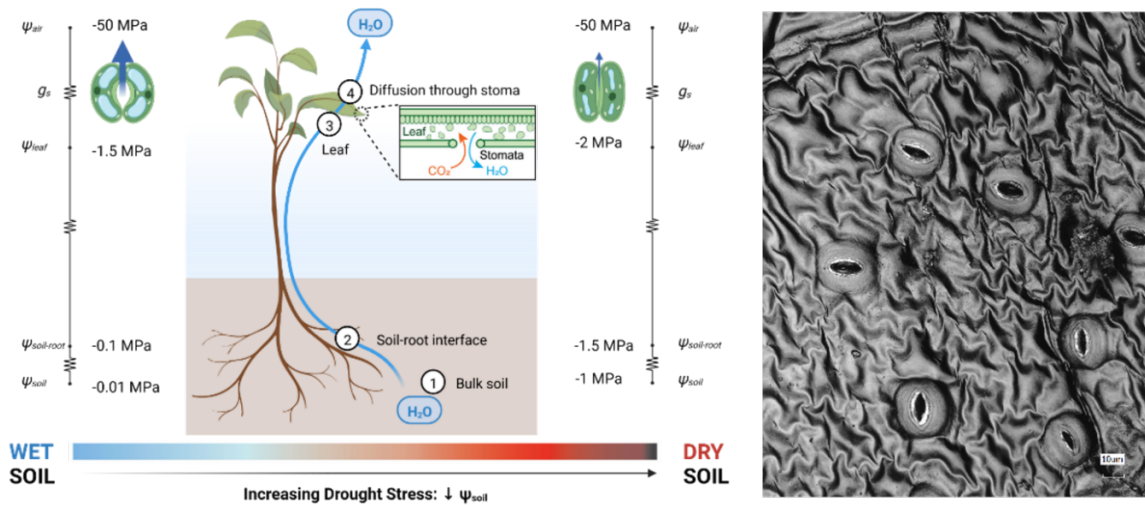


Stomatal regulation of terrestrial fluxes: soil-plant hydraulics and stomatal optimization during drought



Motivation and Research Questions

Stomata are the master regulators of terrestrial fluxes as they control the exchange of water and carbon with the atmosphere. Their aperture is affected by environmental variability, such as climate-change-driven droughts, and leaf water potentials are an important predictor of stomatal behaviour. However, the specific role of soil, plant and atmosphere in determining leaf water potentials, and thus stomatal behaviour as well as terrestrial fluxes remains elusive. It is therefore an open question how soil, plant and atmospheric properties jointly affect plant water status and terrestrial fluxes by triggering stomatal closure during drought?

Objective and Methods

To answer this and further questions, a laboratory experiment will be conducted with potted plants in a controlled environment and results will be analyzed using a novel model that combines predictions of soil-plant hydraulics and stomatal optimization under variable environmental conditions.

You will:

- Learn how plants react to environmental variability with their stomata and how this affects terrestrial fluxes
- Observe in-situ carbon and water fluxes in a changing environment
- Model the hydraulics and physiology of the plants to disentangle the effects of atmospheric and soil drying on stomatal behaviour and terrestrial fluxes
- Be part of an open-minded, diverse and collaborative working group and a co-author on a publication resulting from this work.

Timeline

The project can be started from now on and is supervised by Prof. Andrea Carminati and Fabian Wankmüller (PhD candidate). We are looking for a highly motivated student interested in both experimental and modelling work in the fields of soil-plant hydraulics and plant ecophysiology.

If you are interested in the project, please contact andrea.carminati@usys.ethz.ch and fabian.wankmueller@usys.ethz.ch