

BayCEER Kolloquium

Lectures in Ecology and
Environmental Research

Winter 2023



UNIVERSITÄT
BAYREUTH

Donnerstag/Thursday

26.10.2023

12:15 in H6, GEO



Prof. Jan Vanderborght

Director Institute of Bio- and Geosciences IBG-3:
Agrosphere, Forschungszentrum Jülich GmbH

Modelling root water uptake: from root segments up to the field plot scale

Uptake of water by plant roots is a major component of the soil water balance and an accurate simulation of this process is a prerequisite to simulate soil water fluxes and transport processes in the soil profile accurately. Accurately simulating root water uptake is also important for predicting vegetation/crop growth and associated with it carbon assimilation. To improve the mechanistic description of this process, we developed a simulation model that simulates the flow process in the three-dimensional root system architecture and coupled it to a description of flow in the soil. With this model, the impact of root system architecture, hydraulic properties of root segments and of the soil just around roots on the uptake capacity by the root system can be assessed and accounted for. However, the description of three-dimensional flow comes with a high computational cost and makes it impossible to simulate processes at the field and landscape scales. Therefore, we developed upscaling approaches that describe uptake without representing flow to and in individual root segments.

