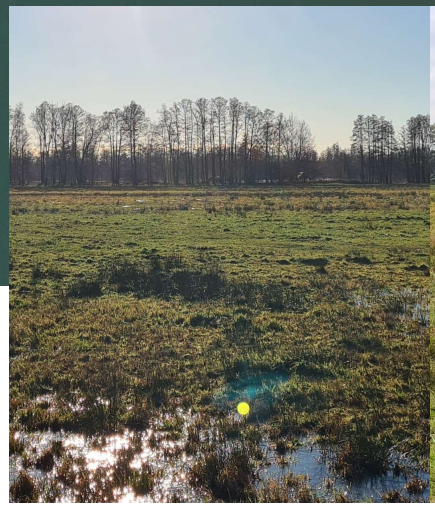
Leibniz Centre for Agricultural Landscape Research (ZALF)

Modeling the water fluxes in the profile of a degraded lowland site

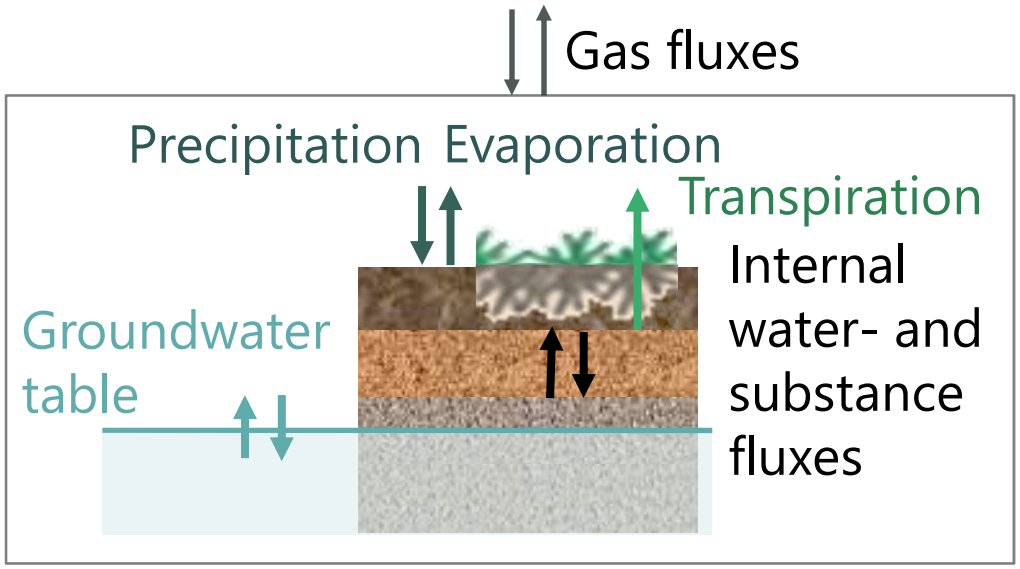
Mariel Davies
Ottfried Dietrich
Christoph Merz



Freie Universität Berlin

Problem Statement and Objectives

- Complex processes in variably saturated „transition“ zone
- Turnover processes are influenced by **water contents and fluxes**



Objective:

- model **water contents and fluxes** and characterise processes
- in high temporal and spatial resolution
- as a basis for understanding the turnover processes.

Hydraulic model

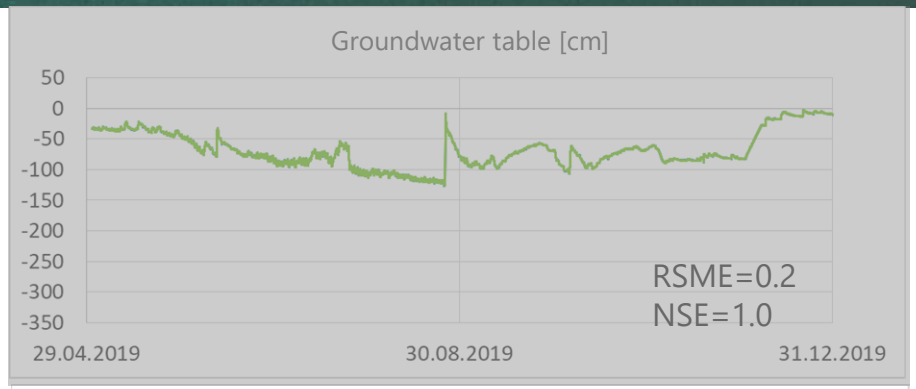
- **Software: Hydrus-1D**
  1D numerical modeling based on Richards equation

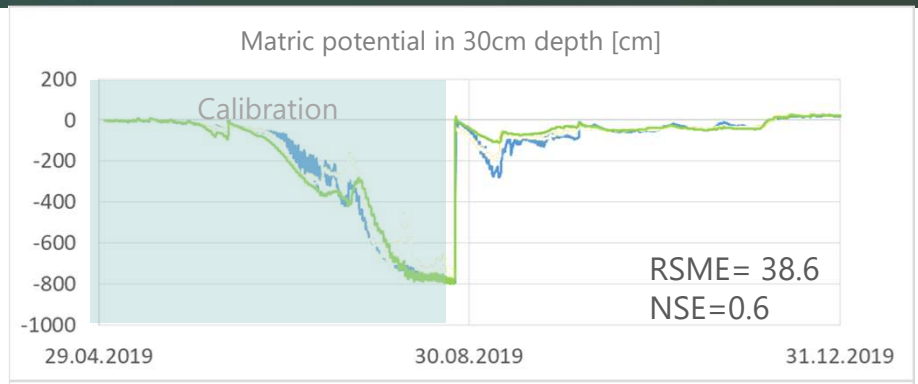
- **Resolution: high**
  time series: h
  soil profile: cm

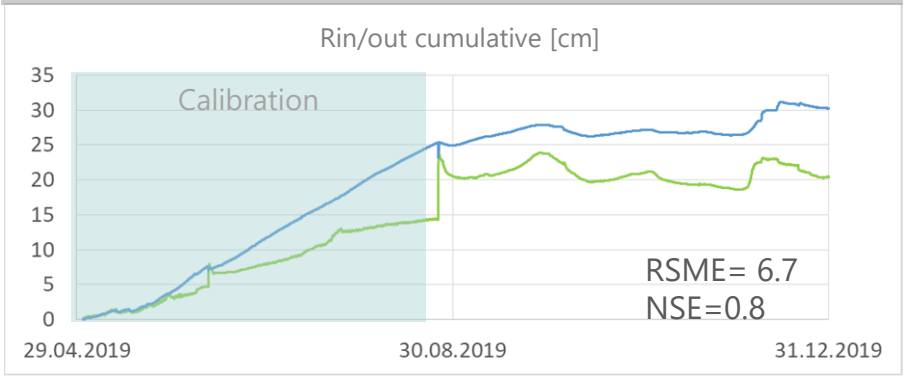
- **Soil:** Mollic gleysol
  3 Horizons: 0-40 cm
  40-55 cm
  55-200 cm

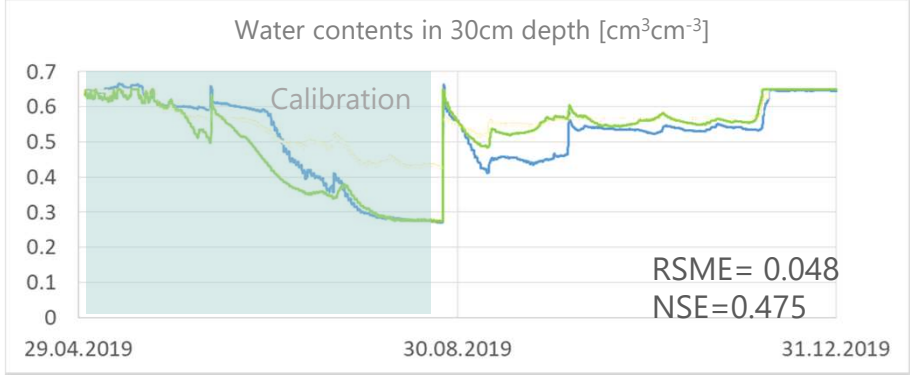
- **Inputs from lysimeter data:**
  Fluxes at upper boundary P, ETa
  Fluxes at lower boundary $R_{in/out}$ or groundwater table (GW)
- **Model output:**
  θ, Ψ, water fluxes throughout profile, GW, $R_{in/\ out}$

Result of variant groundwater table as input



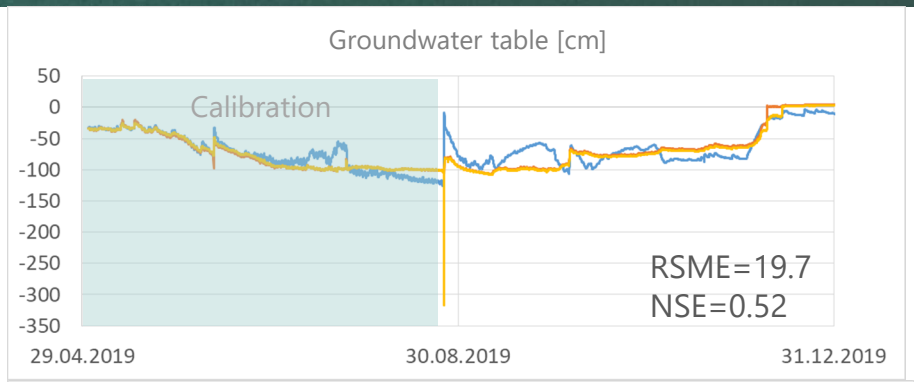


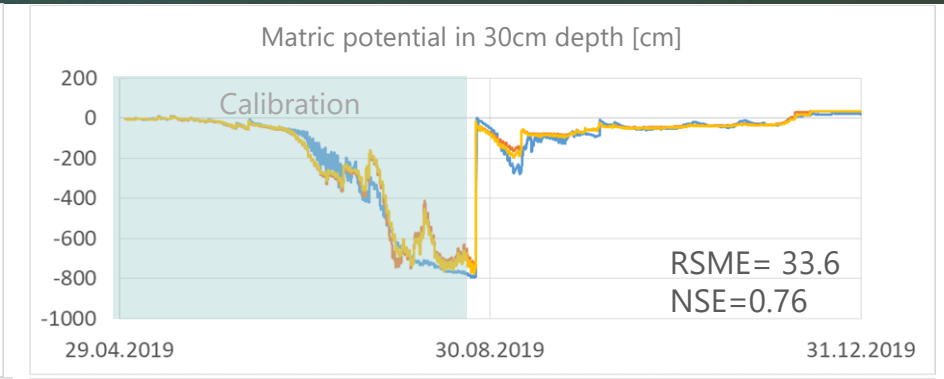


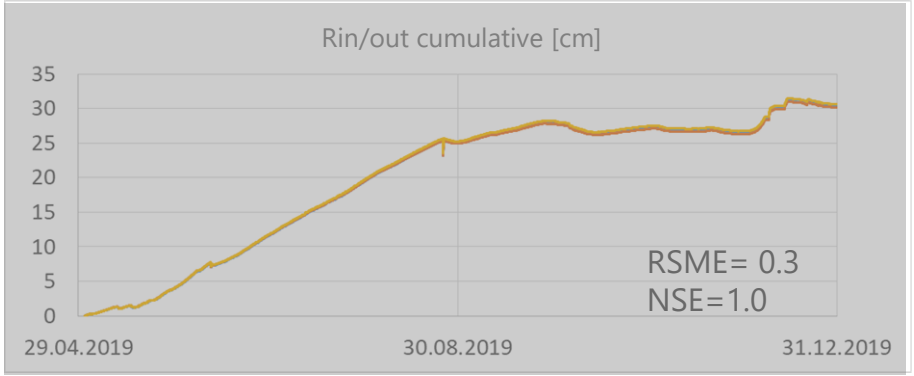


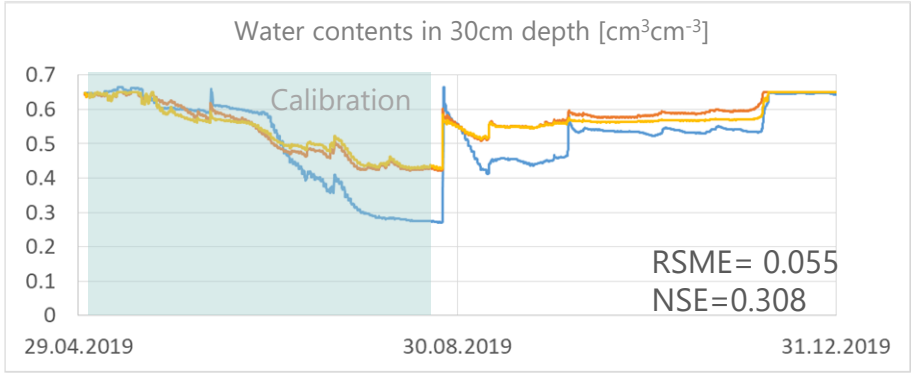
Measured Simulated (dual porosity setup)

Result of variant Rin/out as input









Measured Simulated (dual porosity setup)

Conclusion

- **Water contents and water fluxes** are modeled well
  - Despite transient conditions and layered soils
  - Intense rainfall events cause errors
  - Model makes further processes visible:
    air entrapment, peferential flow through macropores/dual porosity

- Model can be used as a basis for **reactive transport modeling**

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Contact: Mariel Davies, davies@zalf.de, Tel.: +49 (0)33432 82-178