

On the identifiability of soil hydraulic parameters in lysimeter experiments: a Bayesian perspective

Marleen Schübl, Giuseppe Brunetti, and Christine Stumpp

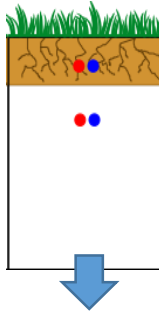
University of Natural Resources and Life Sciences (BOKU) Vienna, Institute for Soil Physics and Rural Water Management, Water-Atmosphere-Environment, Austria (marleen.schuebl@boku.ac.at)

Aim:

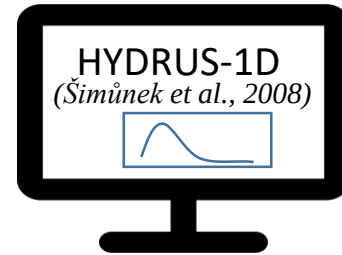
Identification of **type and combination of measurements** which are most efficient in estimating SHPs and **reducing uncertainty** in seepage prediction

7 Data Scenarios

- Gravimetric monolith lysimeter (Seepage **Q**)
 - TDR probes (Soil water content **SWC**)
 - Tensiometers (Matric potential **MP**)
- Time series (daily)
March - October



Bayesian model framework



Bayesian inference

$$\text{Posterior } P(\theta | D, M) = \frac{\text{Data likelihood } P(D | M, \theta) \cdot \text{Prior } P(\theta | M)}{P(D | M)}$$

Quantification of gain in information: Kullback-Leibler divergence*:

$$KLD(p(x) \parallel q(x)) = \int p(x) \log\left(\frac{p(x)}{q(x)}\right) dx$$

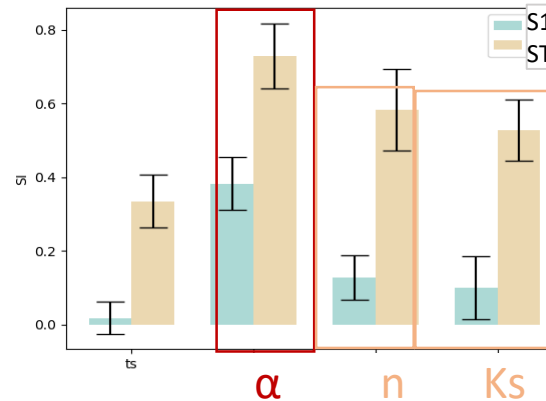
Main result & conclusion:

→ Most efficient in informing sensitive parameters and in reducing uncertainty in seepage prediction:

Simultaneous assimilation of daily seepage + matric potential measurements

→ No general statement; comprehensive analysis with different soils and climates required

Global Sensitivity Analysis Sobol' Indices cumulative seepage



Param.	Opt. scenario*
α :	Q+MP
n :	MP
K_s	Q+MP

