TECHNISCHE UNIVERSITÄT DRESDEN

NATIONALPARK Bayerischer Wald

DRESDEN concept

EGU 2020 - Session Isotopes and Tracers

Hydrological analysis of runoff formation in a small forested mountain catchments using $\delta^{2}H$ and $\delta^{18}O$ ratios

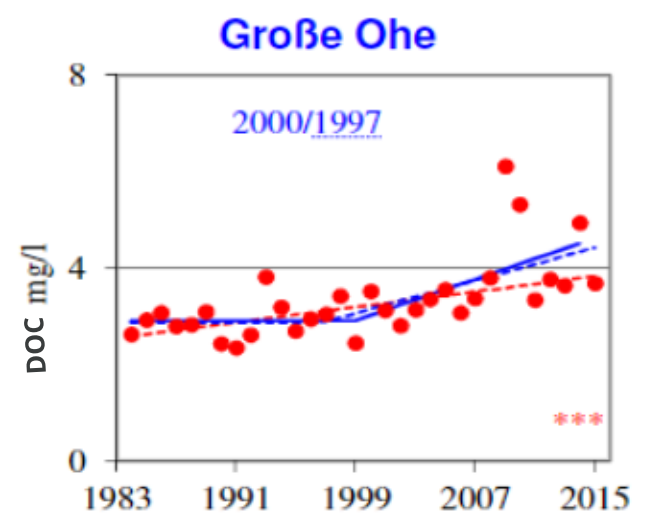
Lisa Rommel, Dr. Thomas Wöhling

TU Dresden

lisa.rommel@tu-dresden.de

Motivation: Model development for hydrological DOC * -mobilization

Rising DOC trends in surface waters



Junior Research Group: Processes of **DOC mobilization** in catchments

Export of DOC mainly through **hydrological pathways**

Development of **hydrological model** for DOC-export from catchments

Field campaign

collection of field data (discharge, groundwater table, soil moisture, T, EC, Water Sampling, soil analyses)

Process analysis

identification of runoff formation with multiple natural tracers (i.a. δ^2H, $\delta^{18}O$), water origin, pathways, mobilization areas, retention times

small scale modeling (hill slope)

small scale runoff formation, preferential flow paths

conceptual modeling (subcatchment and catchment)

upscaling steps, identification of dominant processes, development of scalable hydrological runoff model with implementation of DOC-export

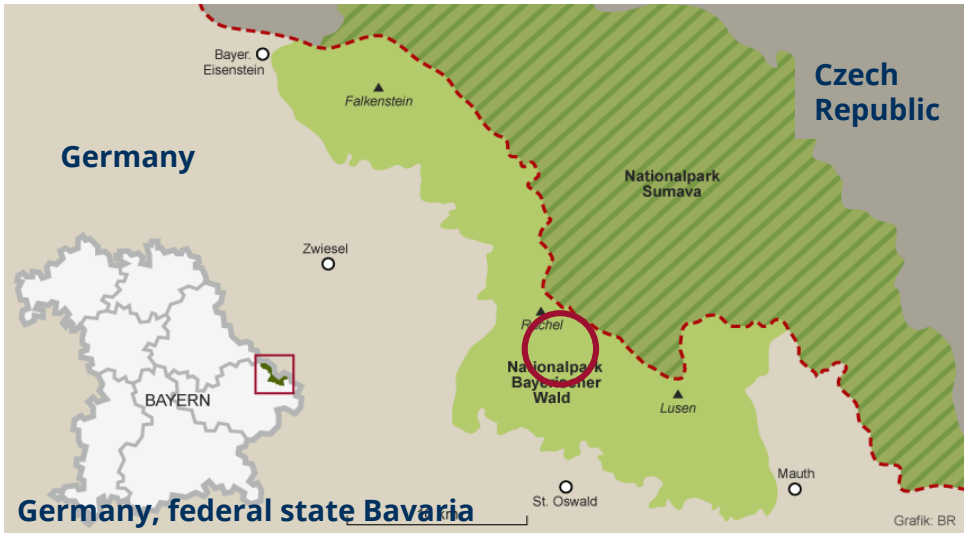
* Dissolved organic carbon

Study area: catchment „Große Ohe“

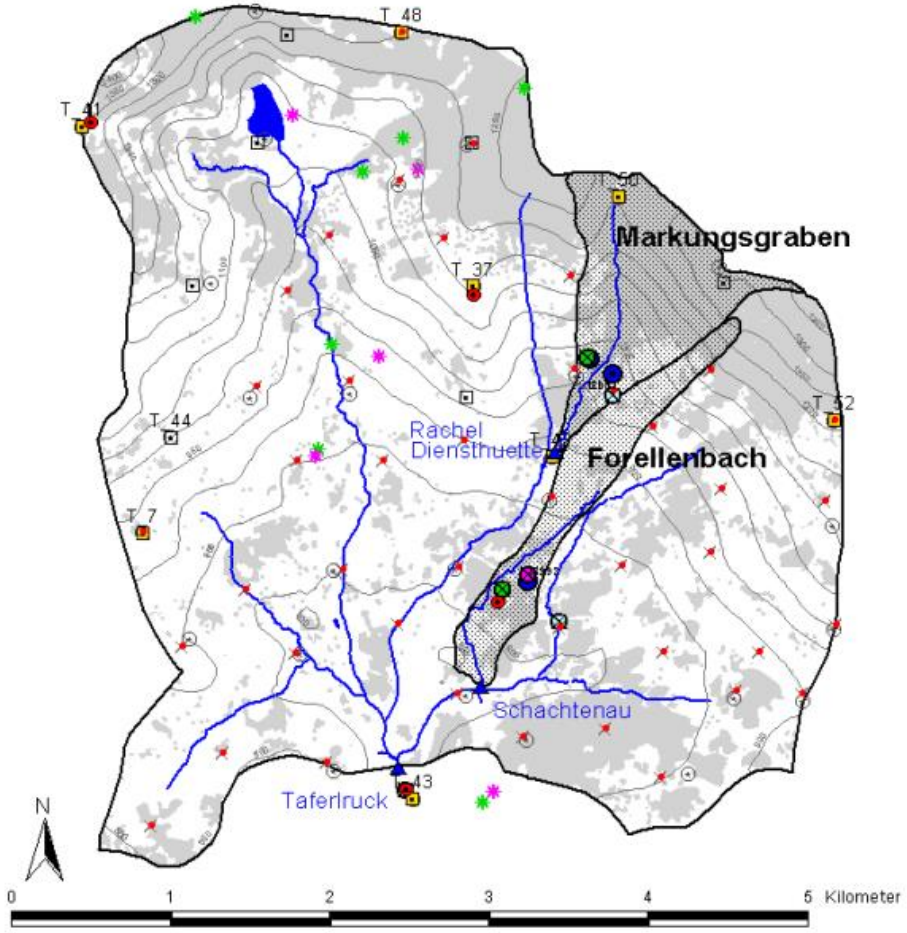
NATIONALPARK Bayerischer Wald

www.nationalpark-bayerischer-wald.bayern.de

- Located in Bavarian Forest National Park
- Head catchment with several subcatchments
- Very few anthropogenical influences
- Dense measuring network
- Long term data series

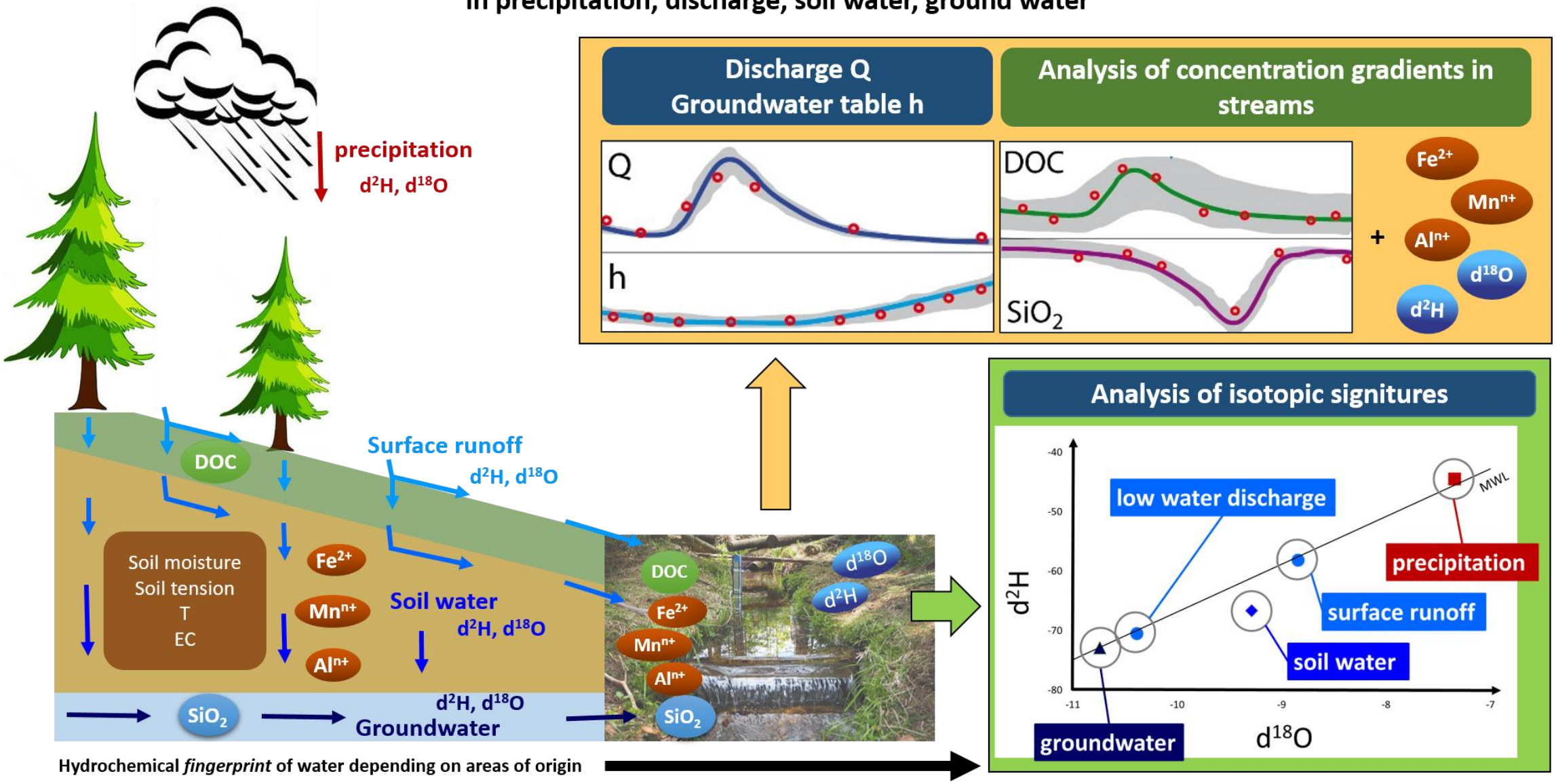


Germany, federal state Bavaria



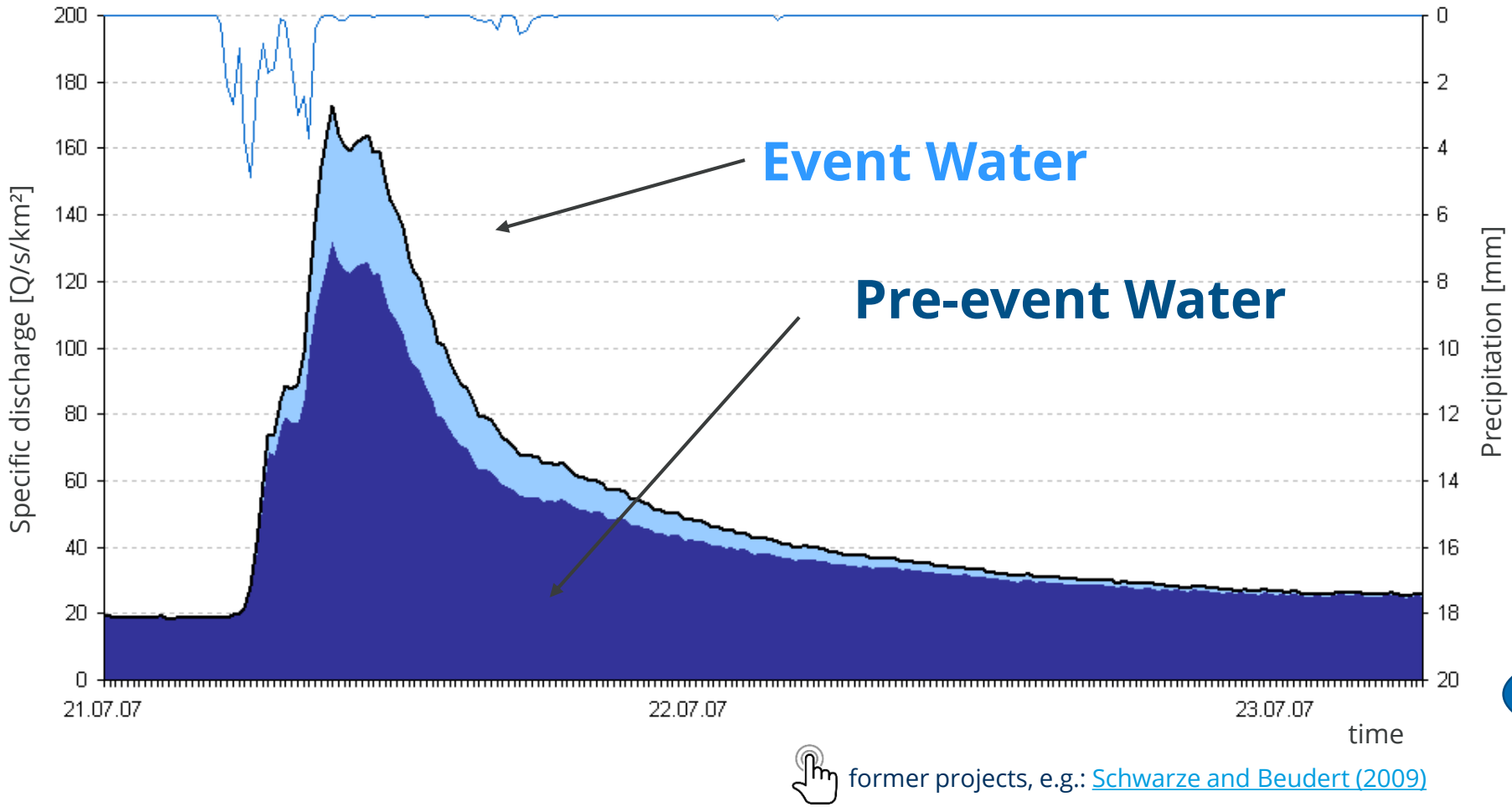
Analysis of runoff formation with environmental tracers

in precipitation, discharge, soil water, ground water



Hydrochemical *fingerprint* of water depending on areas of origin

Isotope based hydrograph separation



former projects, e.g.: Schwarze and Beudert (2009)

Water from **DOC-rich topsoil?**

Water from **mineral horizons**?

Groundwater?

→ **e.g. 3-component hydrograph separation with chemical tracers**

Summary

- **Identification** of **dominant processes** in runoff formation on hill slope and on (sub-)catchment scale
- **Flow paths, areas of origin and retention times** in different hydrological compartments at different discharge conditions
- Development of **hydrological forecast model** with implementation of **DOC-export** from catchments
  - modelling with easily accesible data (generalization of concept)
  - transferable to similar catchments

Acknowledgement

We would like to thank the **GLASER Foundation** and the **PLETTNER Foundation** in the Stifterverband für die Deutsche Wissenschaft for financial support for the doctorate.

We would like to thank the **German Hydrological Society (DHG)** for financial support for the field campaign.