

Using Measurement data on Water and Matter Fluxes in Small Homogeneous Mountainous Catchments for HRU-parameterization in SWAT

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Regionales
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Förderer FKZ: 01 LR 0802

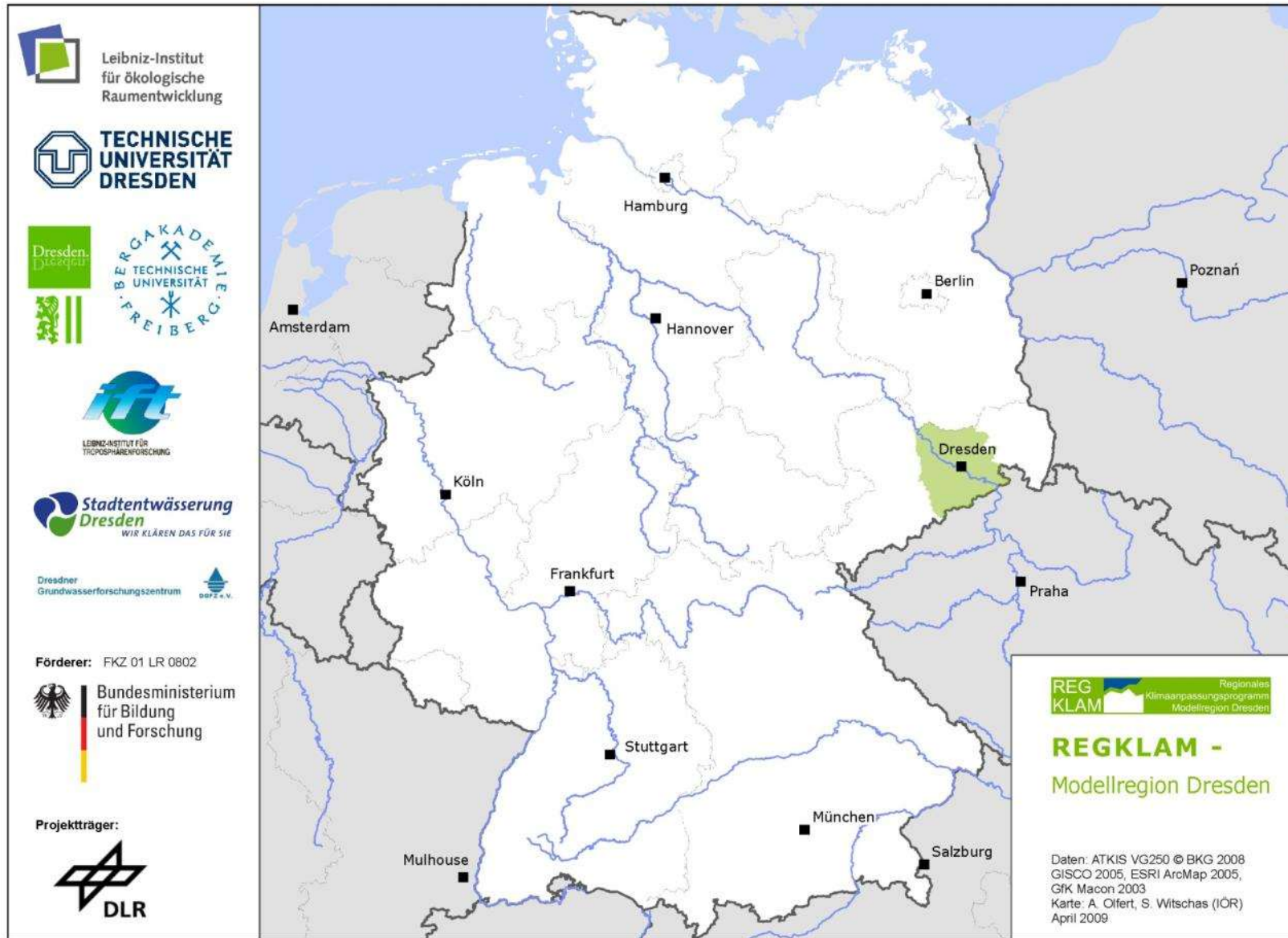


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DLR

Framework



Outline

- Objectives of the Project
- Study site
- Preliminary results – Monitoring
- HRU-Parameterization
- Conclusions

Objectives

- Estimating the effects of future changes in
 - climate,
 - land use, and
 - management / management intensitieson the matter input into drinking water reservoirs
- Filling the lack of data about matter transport from different land-use types
- Improving the knowledge about matter fluxes while storm events and low-flow periods

Study sites



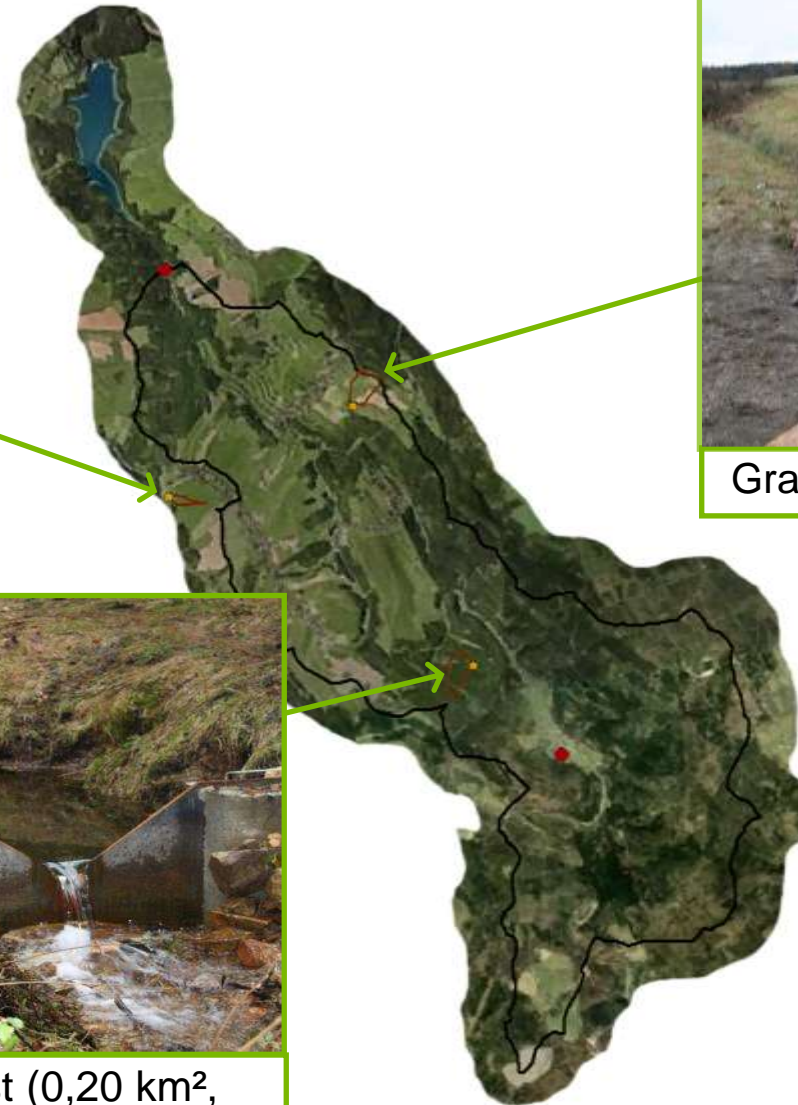
Crop land (0,02 km², 693 m a.s.l.)



Grassland (0,18 km², 637 m a.s.l.)



Forest (0,20 km²,
733 m a.s.l.)



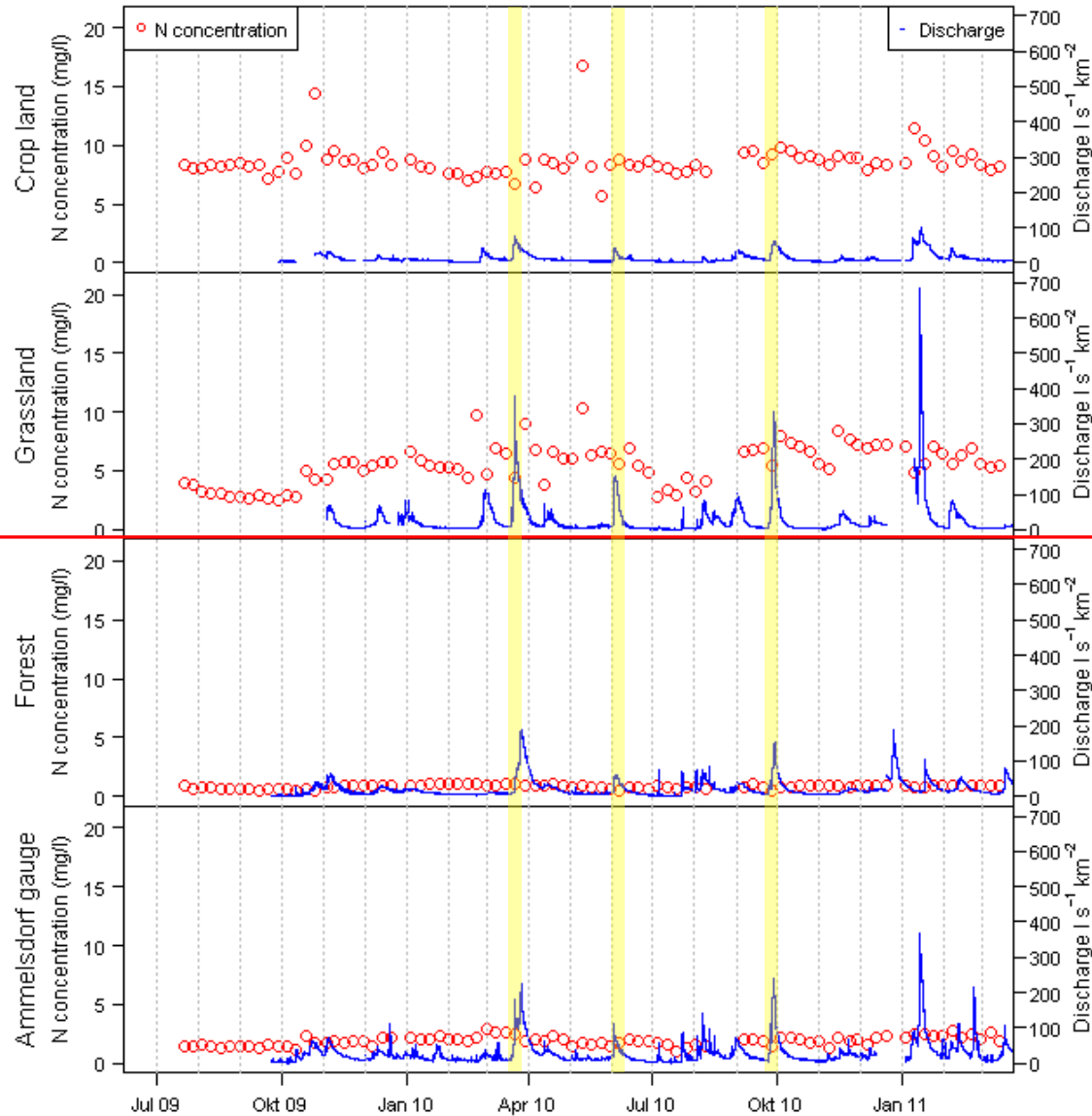
Source: Google Earth

Monitoring program

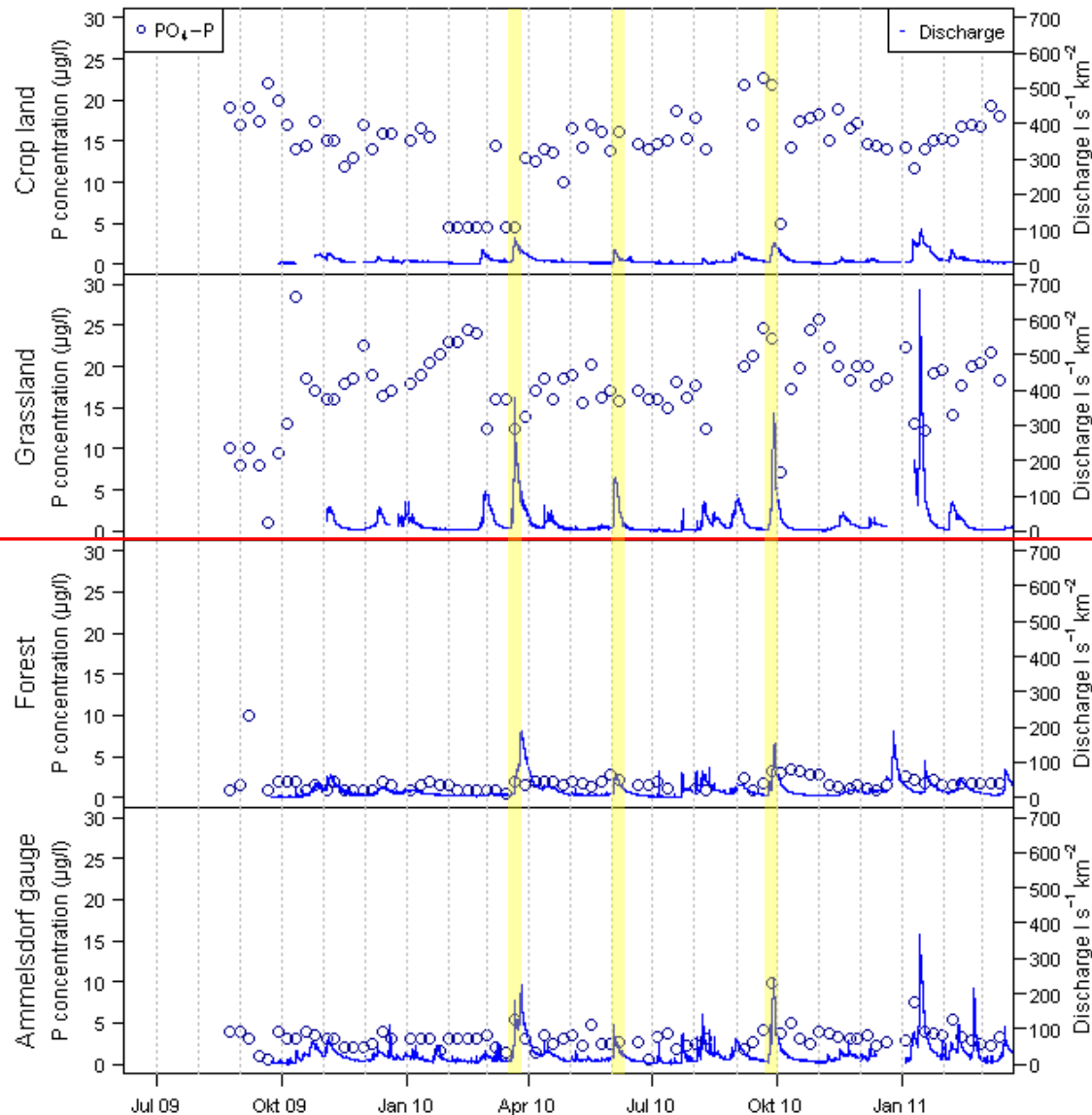
- Continuous discharge measurements (high-resolution, 5 min.)
- Weekly water samplings
- Spectrum of laboratory analysis:
 - Nitrate-N (NO_3^-), Ammonium-N (NH_4^+)
 - Total-P (TP), Soluble-reactive P (PO_4^{3-} -P)
 - Dissolved Organic Carbon (DOC)
 - Cations Na^{2+} , K^+ , Ca^{2+} , Mg^{2+} , Al^{3+} , Fe^{2+} , Mn^{2+} , Zn^{2+}
 - Anions SO_4^{2-} , SiO_4^{4-}
 - pH-value
 - Electric Conductivity



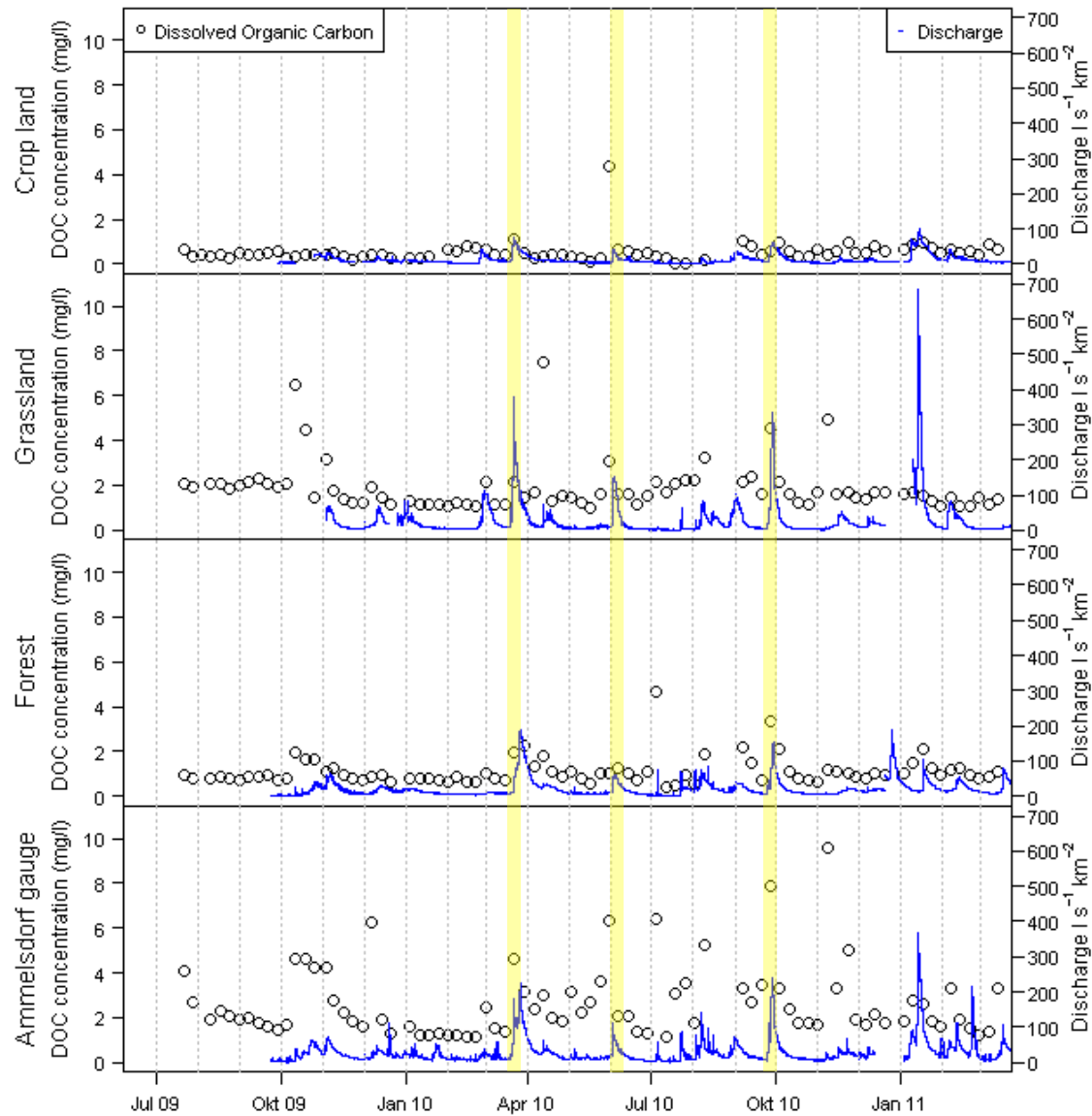
Monitoring program: Nitrogen



Monitoring program: Soluble Reactive Phosphorus

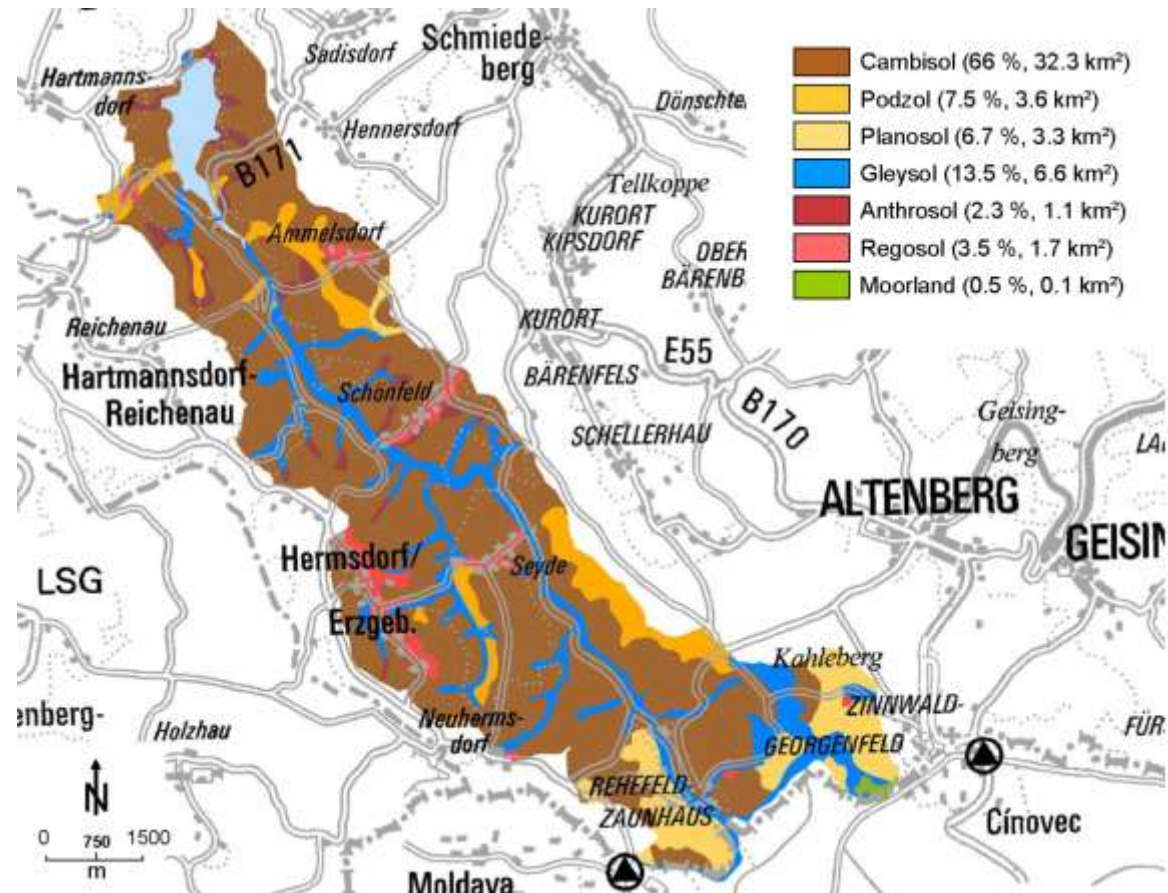


Monitoring program: DOC



SWAT – Spatial input data

- DEM, ATKIS DGM 25, resolution 25 m
- Land-use maps, CIR-data 1993 and 2005
- Soil maps, scale 1:25,000
- 3 meteorological stations, representing the elevation gradient within the catchment



Using measurement data for HRU - parameterization

Detailed soil information



- Saturated conductivity
- Bulk density
- Soil type

Vegetation information



- Crop rotation
- Sowing
- Harvesting

Management information



- Tillage
- Fertilization
- Pestizide application

Measurements of discharge and nutrient concentrations



Plot scale



Catchment scale

Conclusions

Monitoring

- Results show clear differences in nutrient and pollutant exports between different land-use types
 - Highest N- and P-exports from agricultural sites
 - Most DOC exports from organic rich, wet sites (forest & grassland), increasing while storm events with increasing discharge
- Water quality appears to be good at the inflow to the reservoir

Modelling with SWAT

- Very detailed information is available: soil characteristics, vegetation, and management practices → allows for detailed model parameterization
- High-resolution measurement data on discharge and nutrient concentrations provides a good basis to evaluate model outputs

Thanks for your attention !

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