The Harz/Central German Lowland Observatory

Steffen Zacharias, Peter Dietrich, Georg Teutsch

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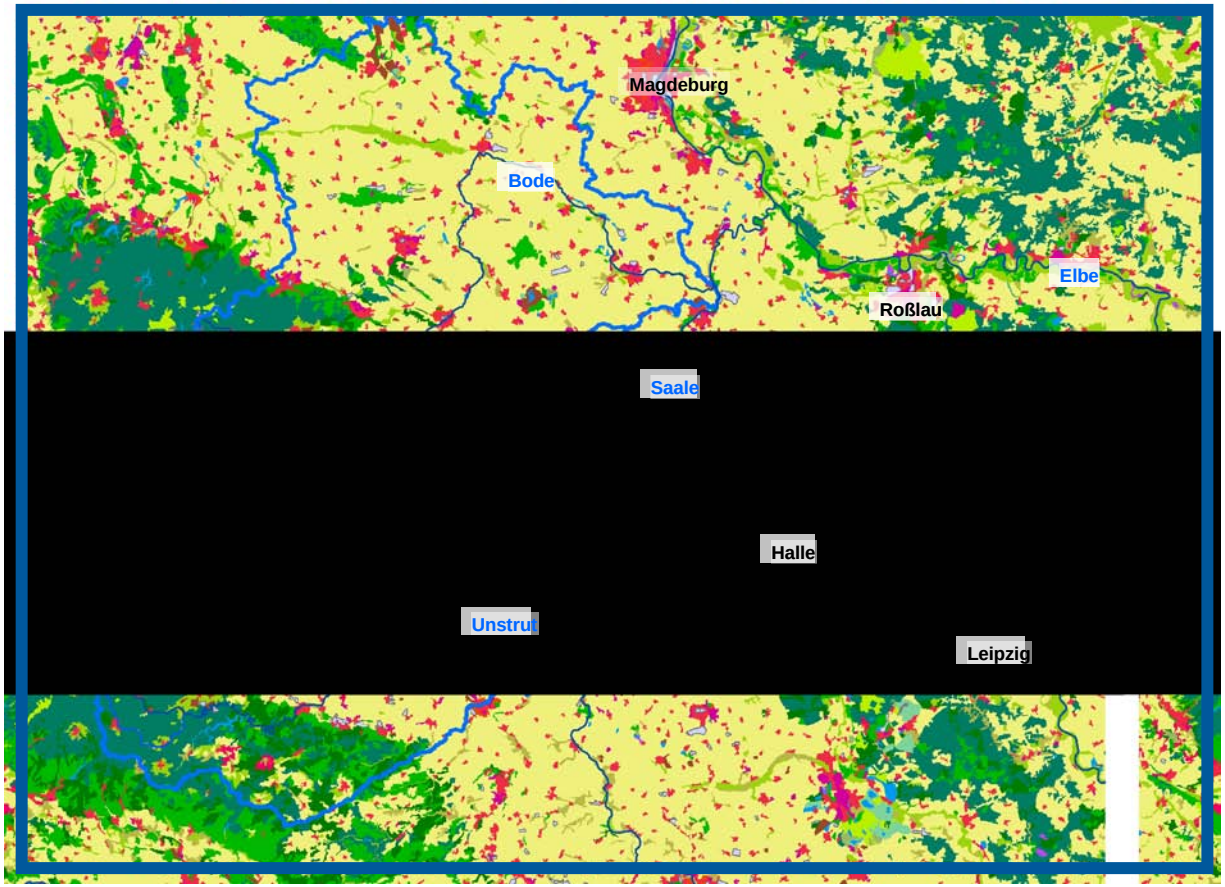

Area: 25.740 km²

North-South-Distance:
approx. 135 km

East-West-Distance: approx.
190 km

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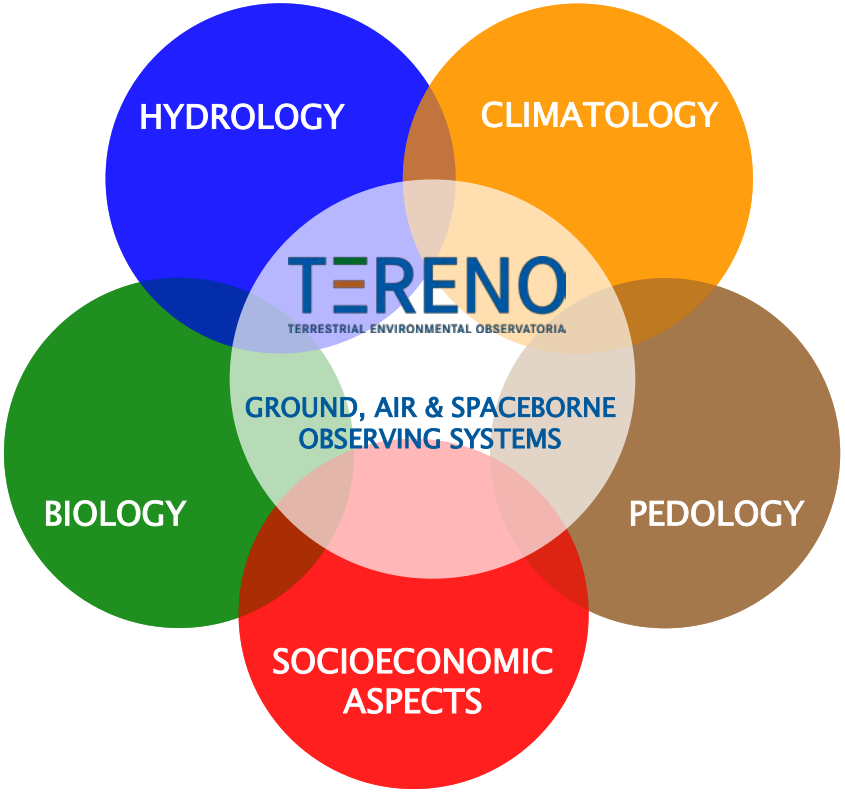
General and Specific Research Objectives



Gradients and boundaries in terrestrial systems under Global Change

Challenges and opportunities for responses on regional scale

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TERENO cross-linking at UFZ

Biodiversity and Terrestrial Ecosystem	Inland Water Resources and Ecosystems	Computational Environmental Systems	Biochemistry/ Technology	Analytics and Ecotoxikology	Health Research	Social Science
Conservation Biology Klaus Henle	Lake Research Matthias Koschorrek	Computational Landscape Ecology Ralf Seppelt	Environmental Microbiology	Analytical Chemistry	Human Exposure Research / Epidemiology	Economics Bernd Hansjürgens
Community Ecology Stefan Klotz	River Ecology Dietrich Borchardt	Computational Hydro Systems Sabine Attinger	Bioremediation	Effect-directed Analysis	Environmental Immunology	Urban & Environmental Sociology
Soil Ecology Francois Buscot	Aquatic Ecosystem Analysis Dietrich Borchardt	Environmental Informatics Olaf Kolditz	Isotope Biogeochemistry	Ecological Chemistry	Proteomics	Environmental & Planning Law
	Isotope Hydrology Stephan Weise	Ecological Modelling	Environmental Technology	Bioanalytical Ecotoxikology	Cell Toxicology	Urban Ecology, Environmental Planning & Transport Ulrike Weiland
	Soil Physics Hans-Jörg Vogel		Groundwater Remediation	System Ecotoxikology Matthias Liess		
			Monitoring and Exploration Technologies Peter Dietrich	Analytical Environmental Chemistry		
			Environmental Biotechnology			
			Hydrogeology Sascha Oswald			

Involved UFZ divisions and departments (blue coloured)

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Specific Research Themes within the Harz/Central German Lowland Observatory – Hydrological Research

- Terrestrial water fluxes and regional water cycle
  - To develope a new hybrid model setup comprising simple and complex models in order to optimize model accuracy and computational efficiency
- „Reactive Zones“ and quality of ground and surface water
  - To quantify the function of the vadose zone for retention, transformation and especially solute transport towards groundwater in response to climate and land use
  - To describe the impact of the hyporheic zone as reactive interface between groundwater and surface water at the catchment scale
- Status and function of aquatic ecosystems
  - To comprehensively process-based analyse external and internal factors that control eutrophication in running waters
  - To analyze the ecological status and the recovery of managed riparian zones
- Water governance, management, options and implementation
  - To propose measures to sustainable manage water resources in temperate European regions

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Specific Research Themes within the Harz/Central German Lowland Observatory – Ecological Research

- Land use options – Strategies and adaption to climate change
  - To develop scenarios of desired and possible future developments on a regional scale
  - To develop new methods and tools for the assessment of environmental risks in order to minimize negative direct and indirects human impacts
  - To develop policy recommendations for mitigating and adapting to regional impacts of Global Change (innovative policies, novel instruments and science-policy interfaces, reflexive management strategies)
- Impacts of climate change on ecological patterns and processes
  - To develop scenarios of climate change on ecological systems (local, regional and larger scales)
  - To develop a methodological framework to combine dynamic and static climate change impact models
- Biological effects of contaminants
  - To provide and apply diagnostic and predictive tools for a realistic effect, hazard and risk assessment of chemicals that inform society of emerging pressure on our ecosystem functions

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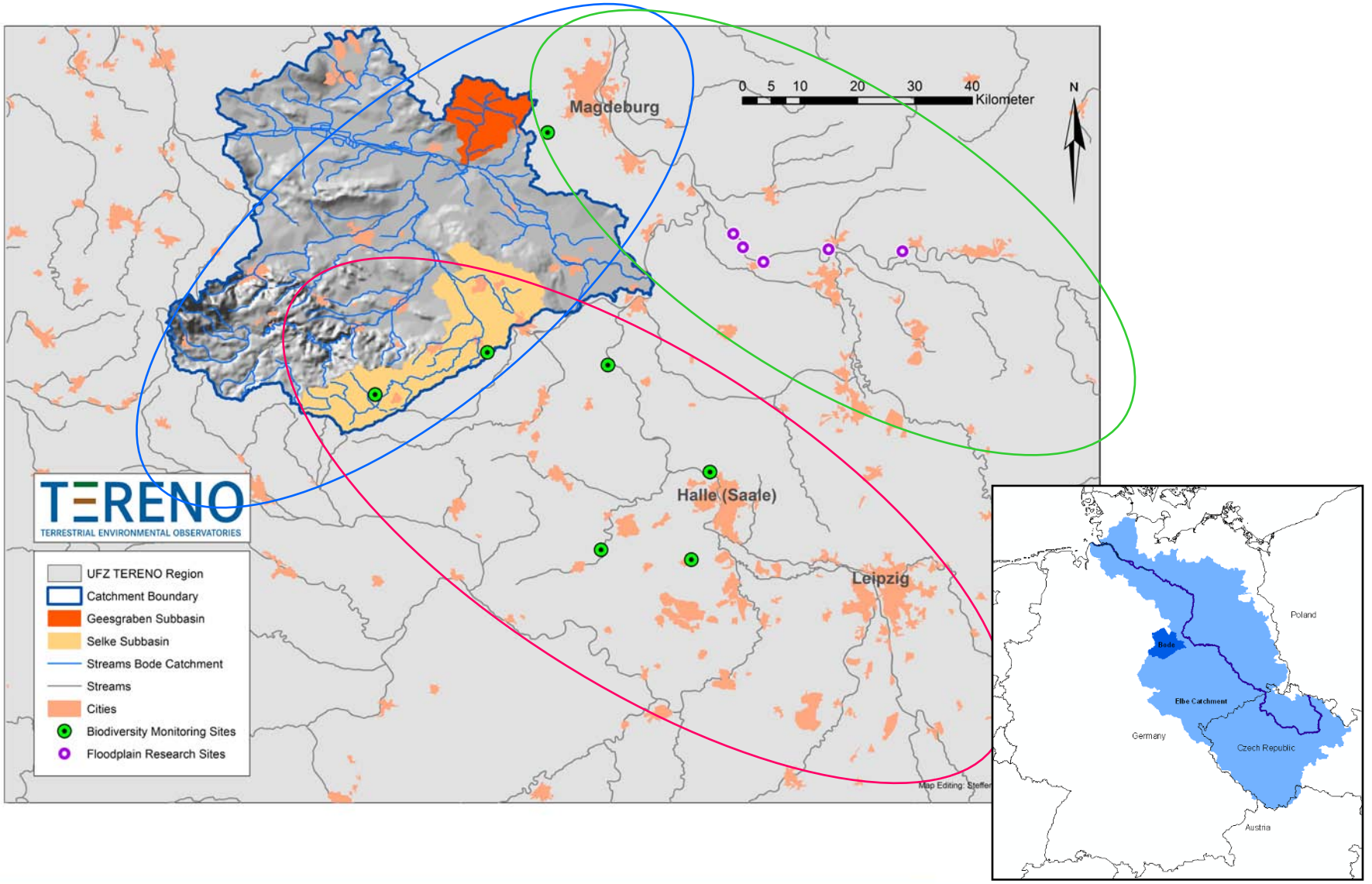

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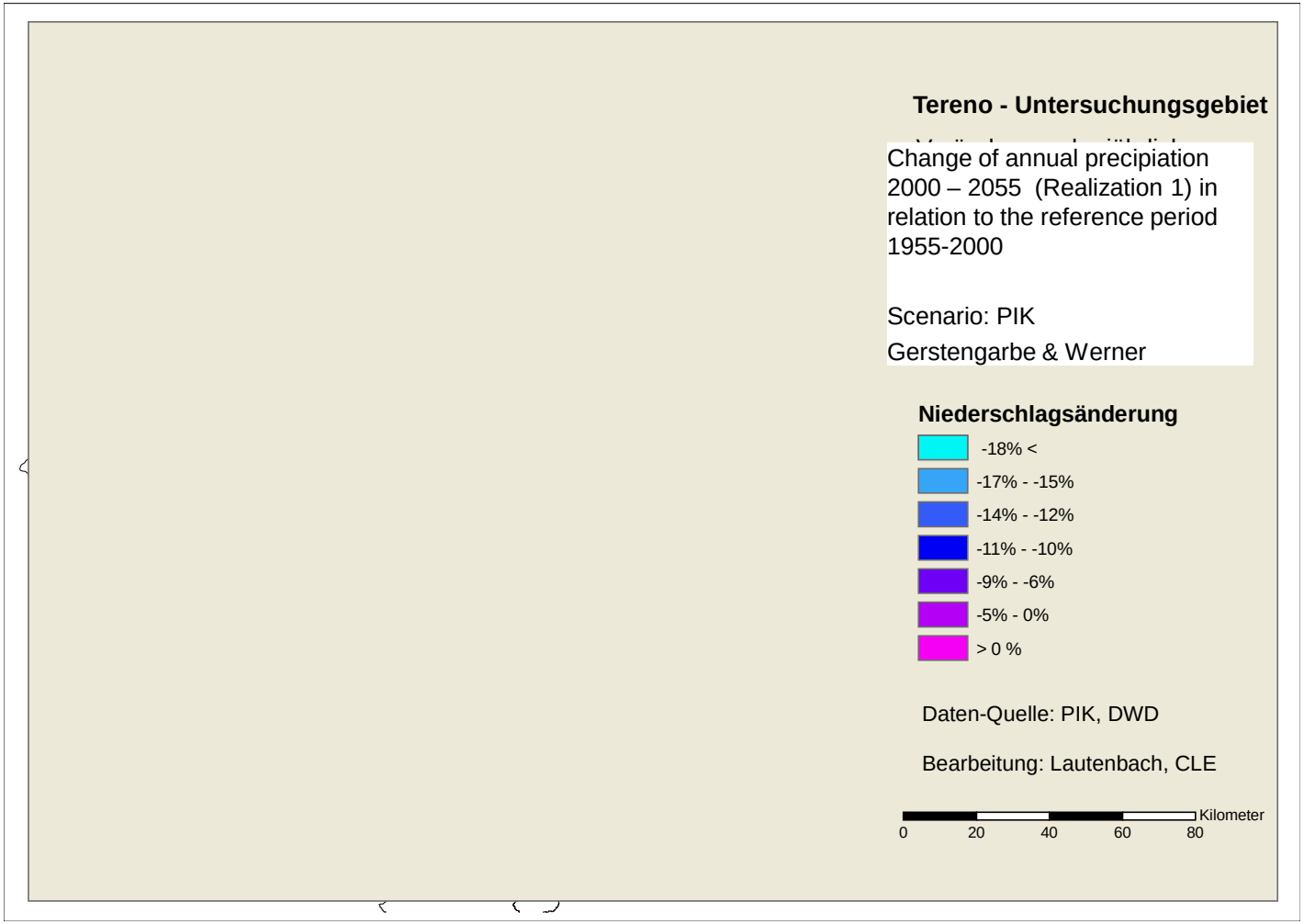
Gradient – Precipitation – predicted Changes



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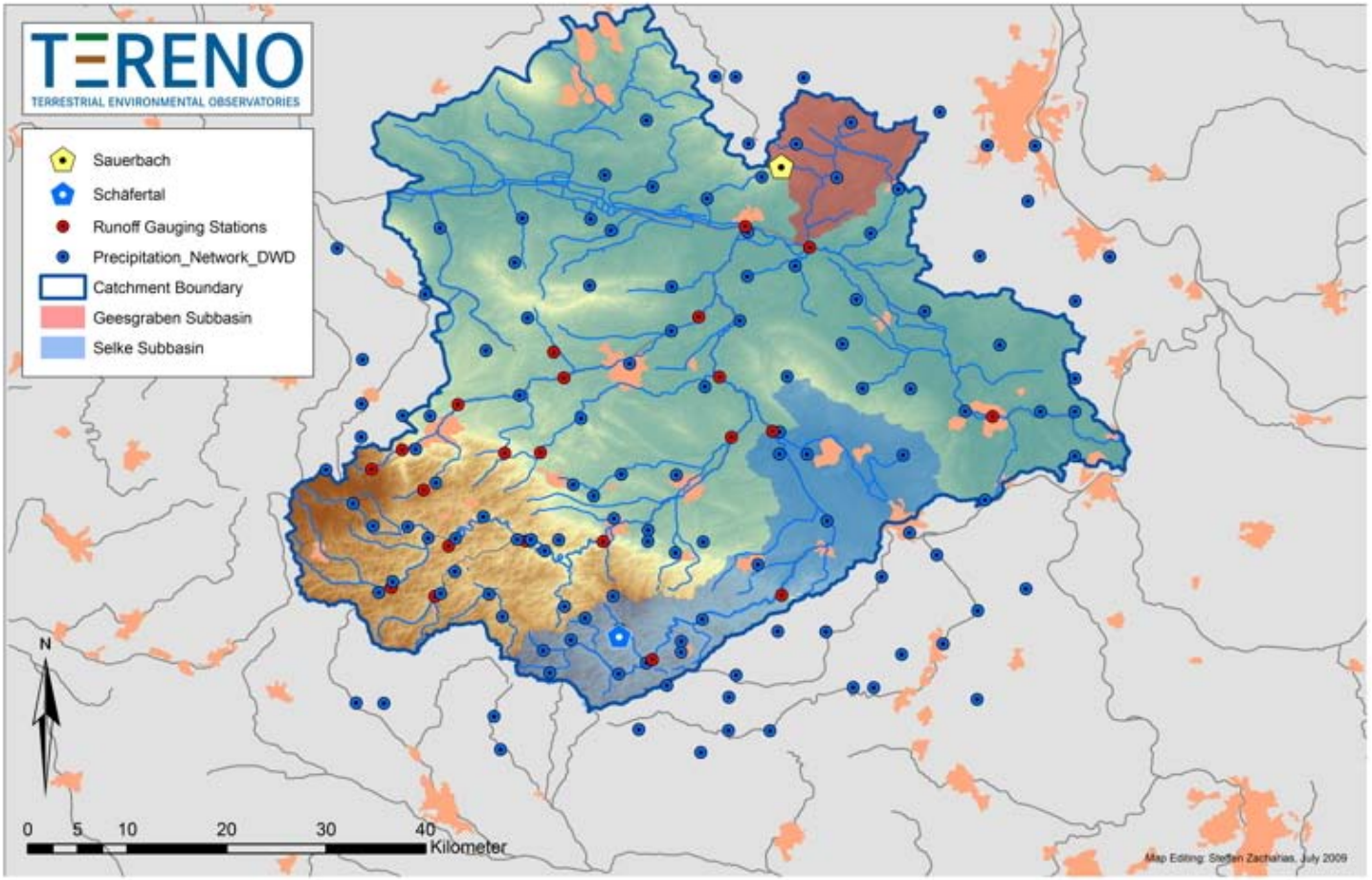
The Bode catchment



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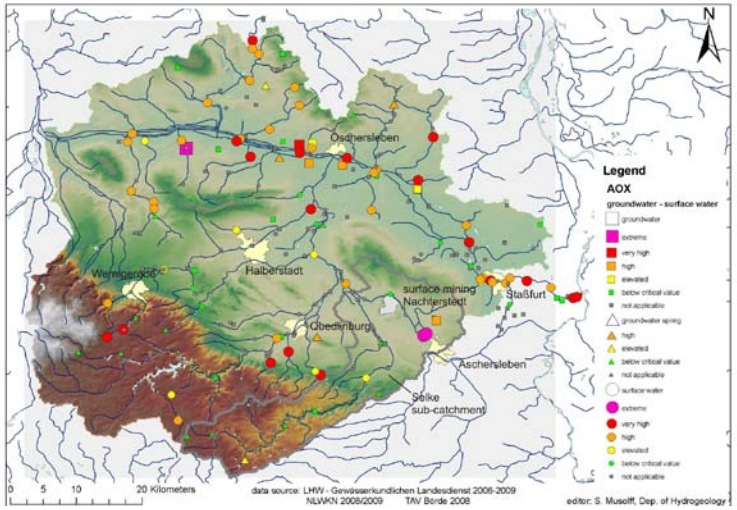
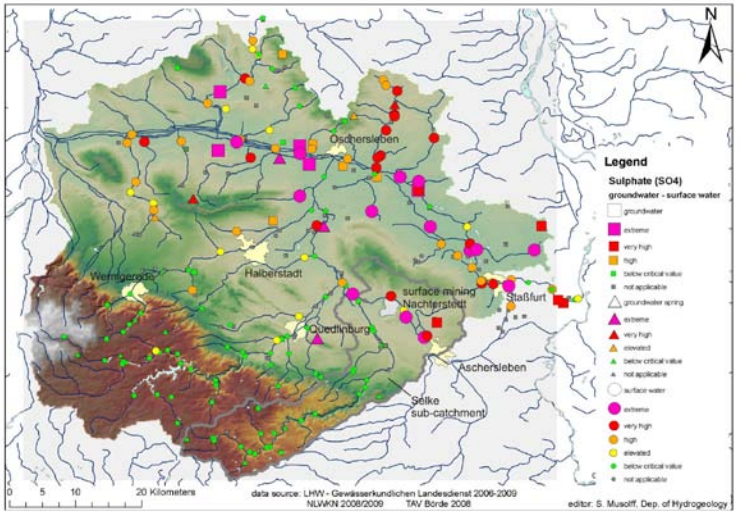
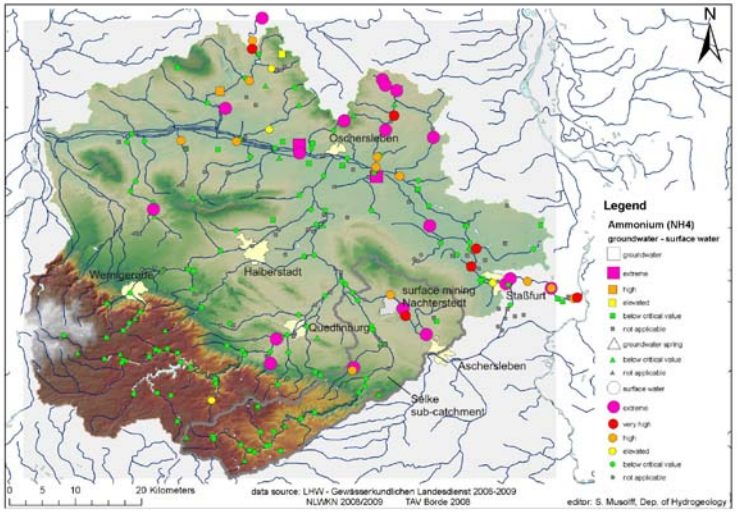
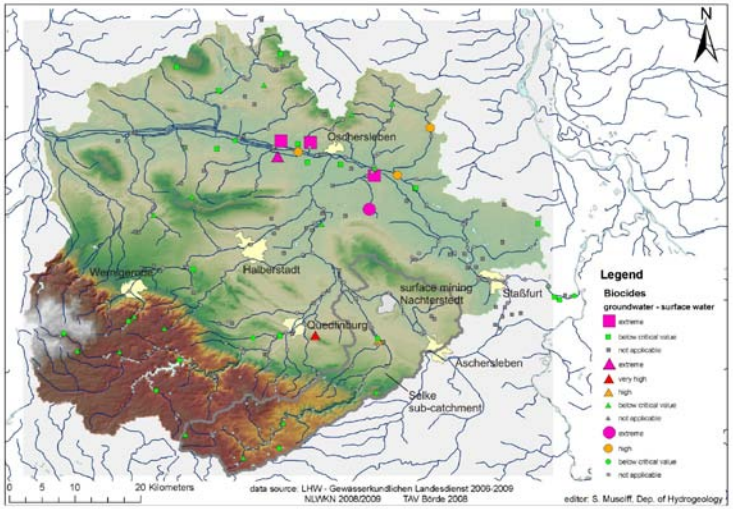
Bode Catchment – Evaluation of Groundwater Quality









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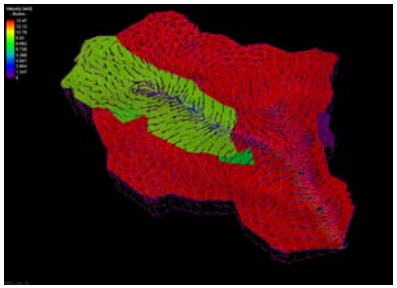
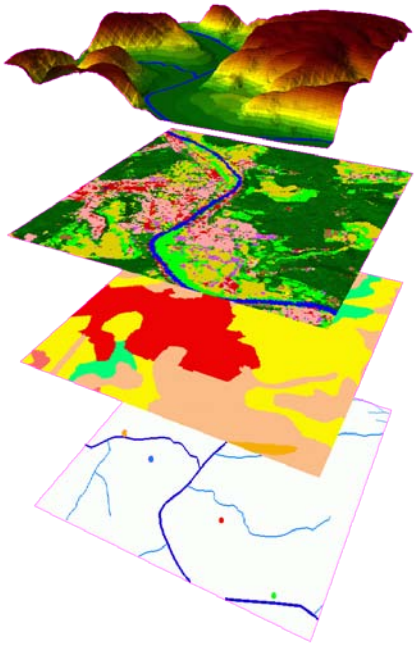
Conceptual approach
Example: Solute Flux management at catchment scale





Process studies in high intensity measurement areas

- small subcatchments
- groundwater transsects
- Stream mapping locations

Identification of dominant processes and development of effective descriptions guided by the structure of the system

Stochastic representation of biochemical transformations (streamline approach)

Estimation of residence time distributions for mesoscale catchments via pedotransfer functions and geophysical proxies

Process-oriented transport simulations based on distributed hydrological model

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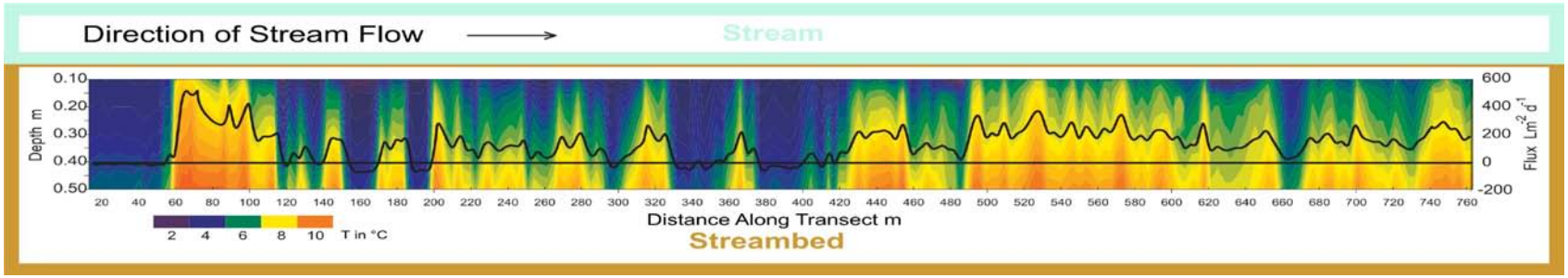
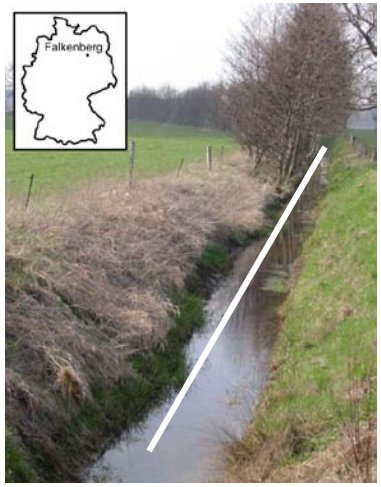
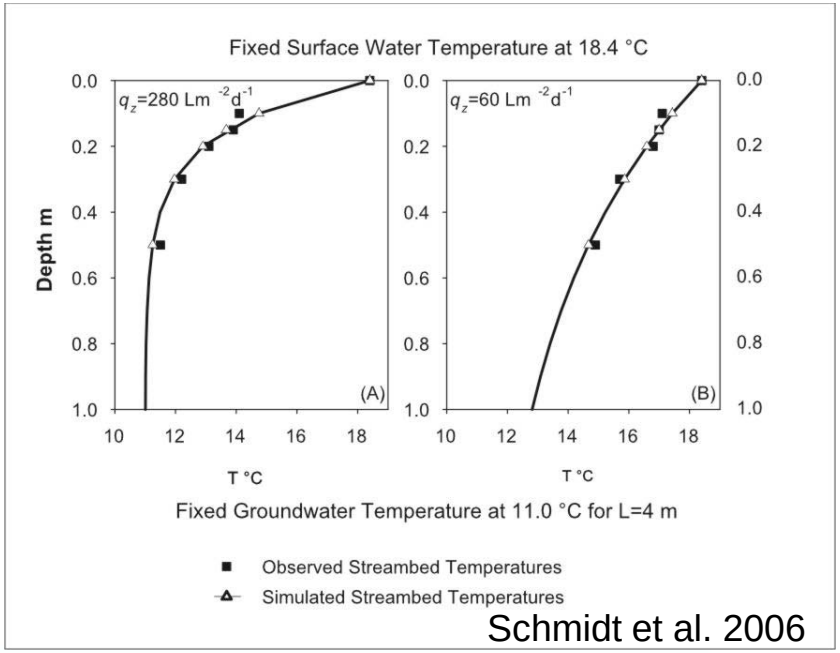
Reach-scale streambed-temperature-mapping to delineate groundwater discharge zones



750 m

Study site





Schmidt et al. 2006

Example temperature profiles with fitted water fluxes

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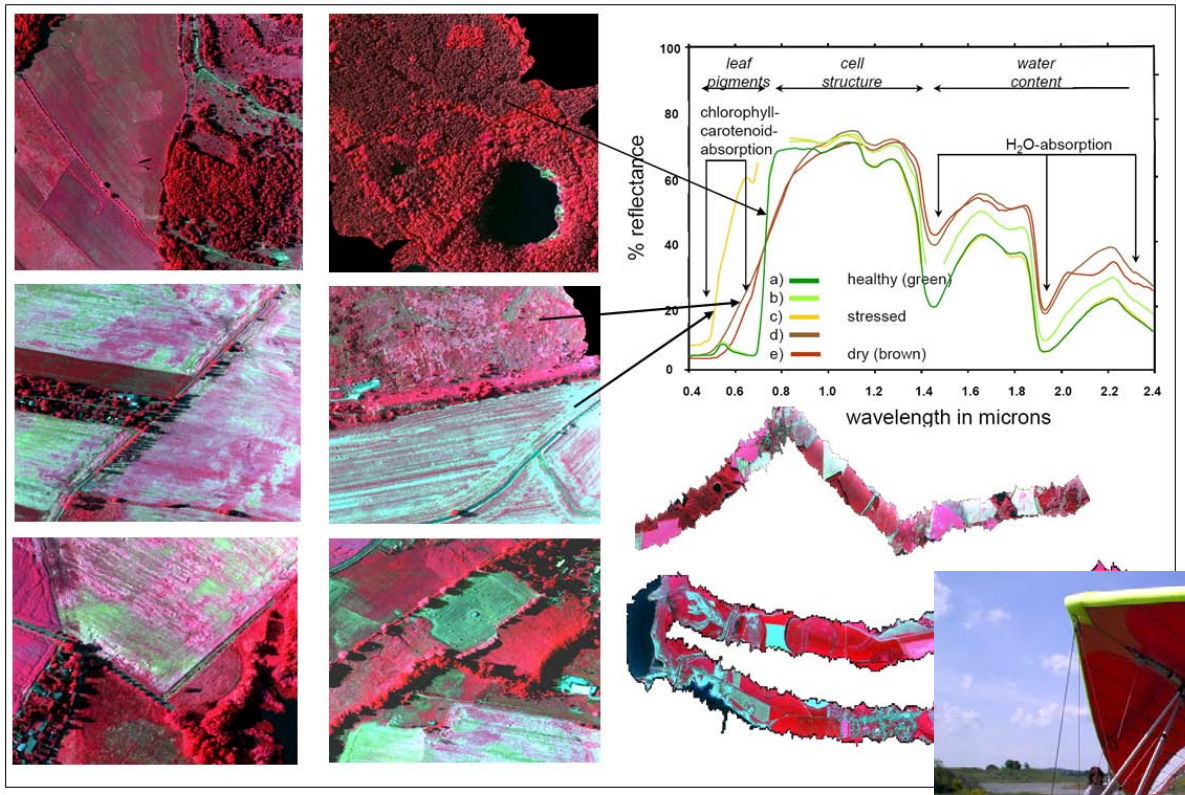
Ultralight-Plane and Hyperspectrum Imagery



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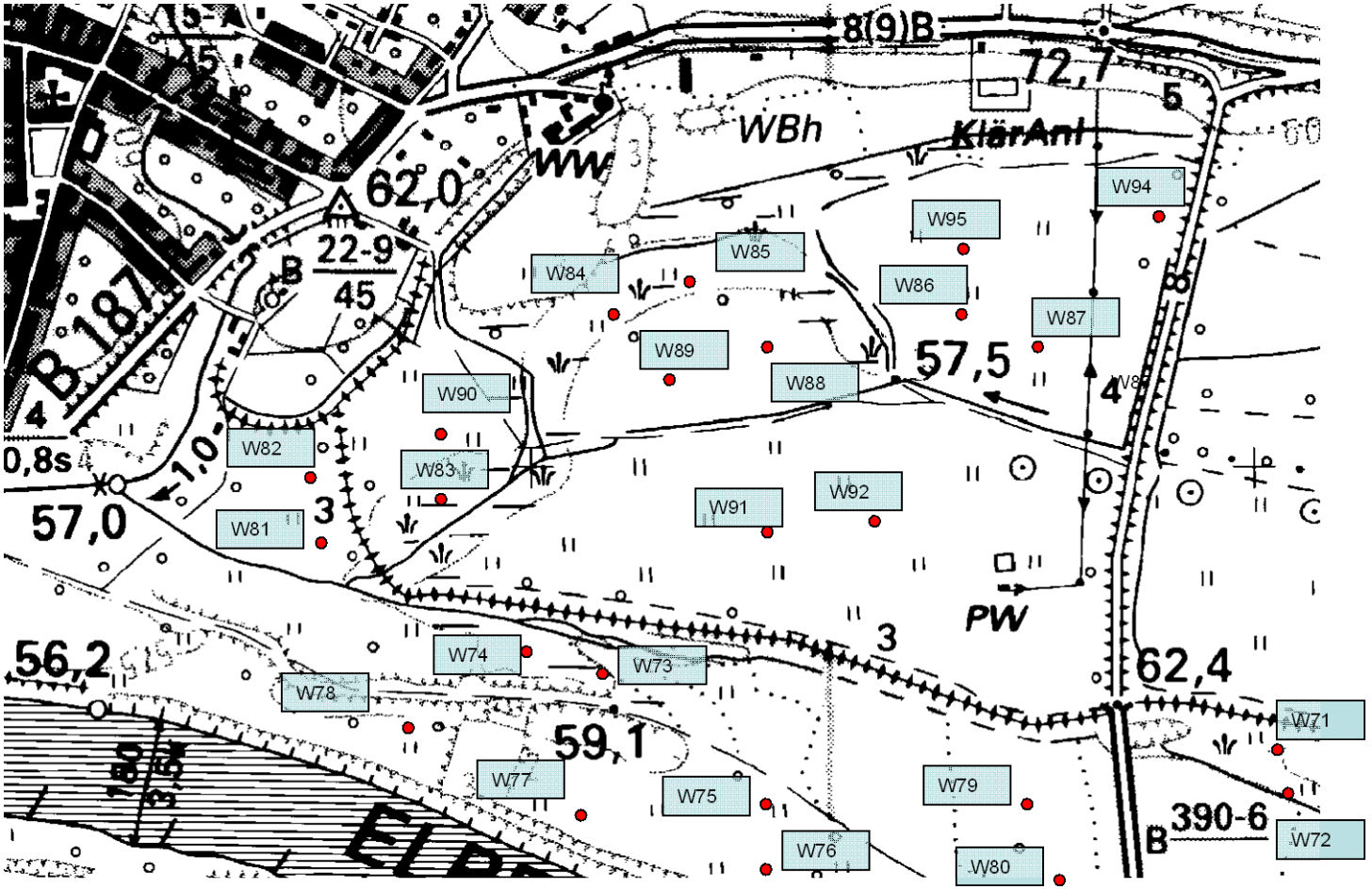
Conceptual approach for biodiversity research

Example: Floodplain Testsite Roßlauer Oberluch



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Implementation Schedule

	2008				2009				2010				2011			
Work packages	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Enhancement of hyperspectrum imagery platform																
Development and deployment of soil moisture sensor networks																
Deployment of runoff gauging stations																
Deployment of Climate stations																
Deployment of EC-stations																
Deployment of groundwater wells																
Accomplishment of air campaigns (soil moisture)																
Geophysical measurements																
Deployment of lysimeter stations (SoilCan)																
Deployment of Vadose Zone Monitoring System																
Deployment of Aquatic Biomonitoring System																
Deployment of DOC measuring stations																
Deployment of temperature monitoring for groundwater -surface water																
Deployment of monitoring system for ecological status of urban water quality																
Enhancement of floodplain platform																
Inventory of basic biodiversity data																
Experiment on ecosystem services																

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Regional and National Networking

University of Leipzig
University of Halle
University of Jena
University of Tübingen
University of Stuttgart
University of Hohenheim
Magdeburg-Stendal University of Applied Science

Saxon State Agency for Environment, Agriculture and Geology

Saxony-Anhalt State Agency for Geology and Mining

Saxony-Anhalt State Agency for Environmental Protection

LTER-Europe

Joint Research Centre WESS – Water Earth System Science

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