The Eifel/Lower Rhine Valley Observatory

Heye Bogena, Thomas Pütz &
Harry Vereecken

TERENO Advisory Board Meeting
October 18/19.10.2009

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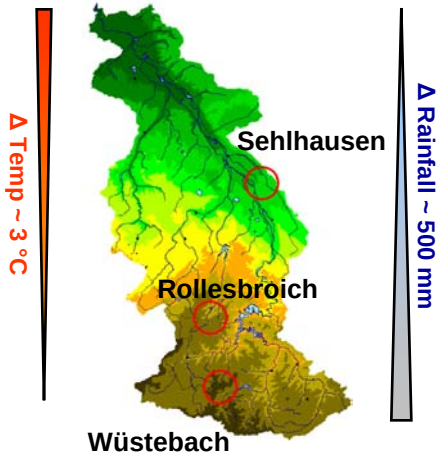
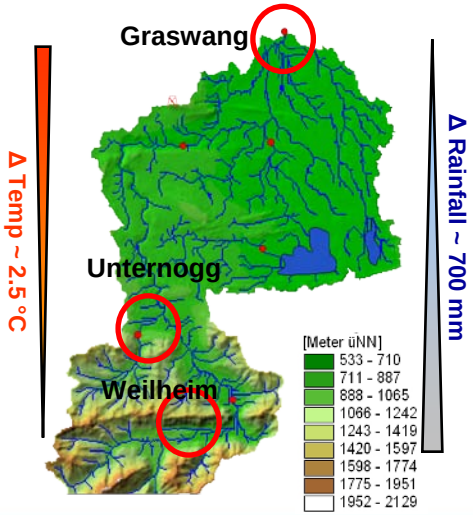
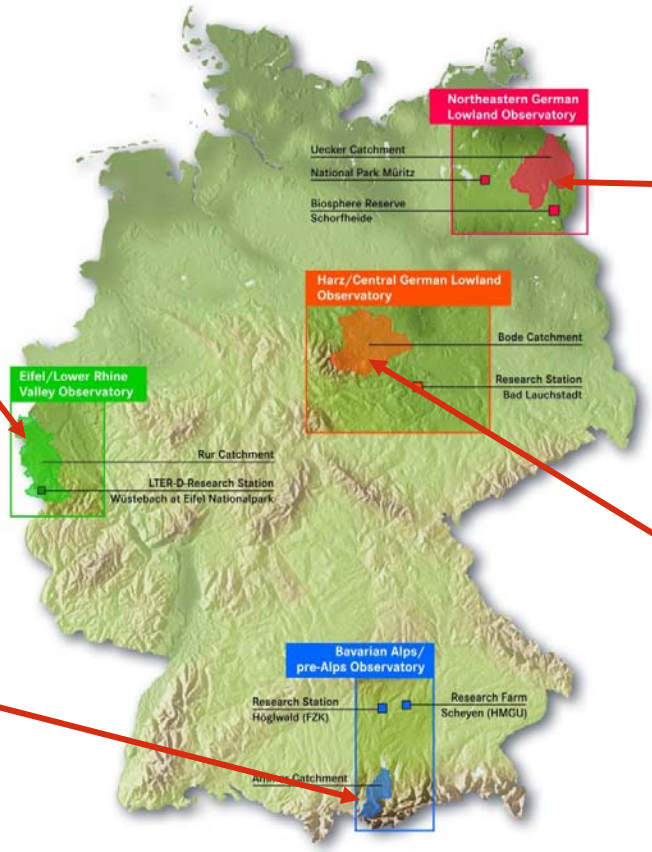
TERENO Lysimeter Network SoilCan

Rur Catchment

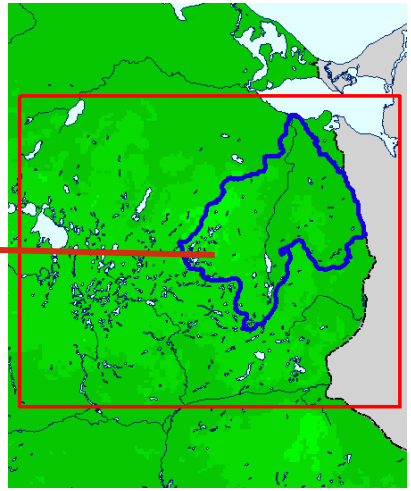


Ammer Catchment

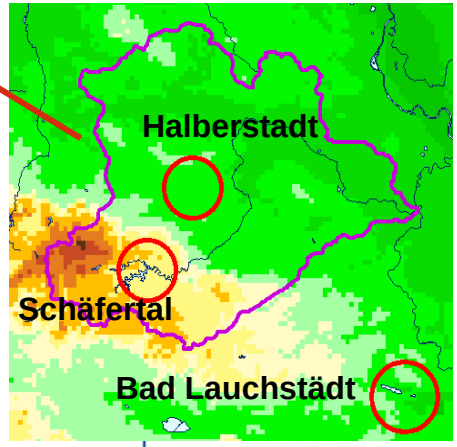




Uecker Catchment



Bode Catchment



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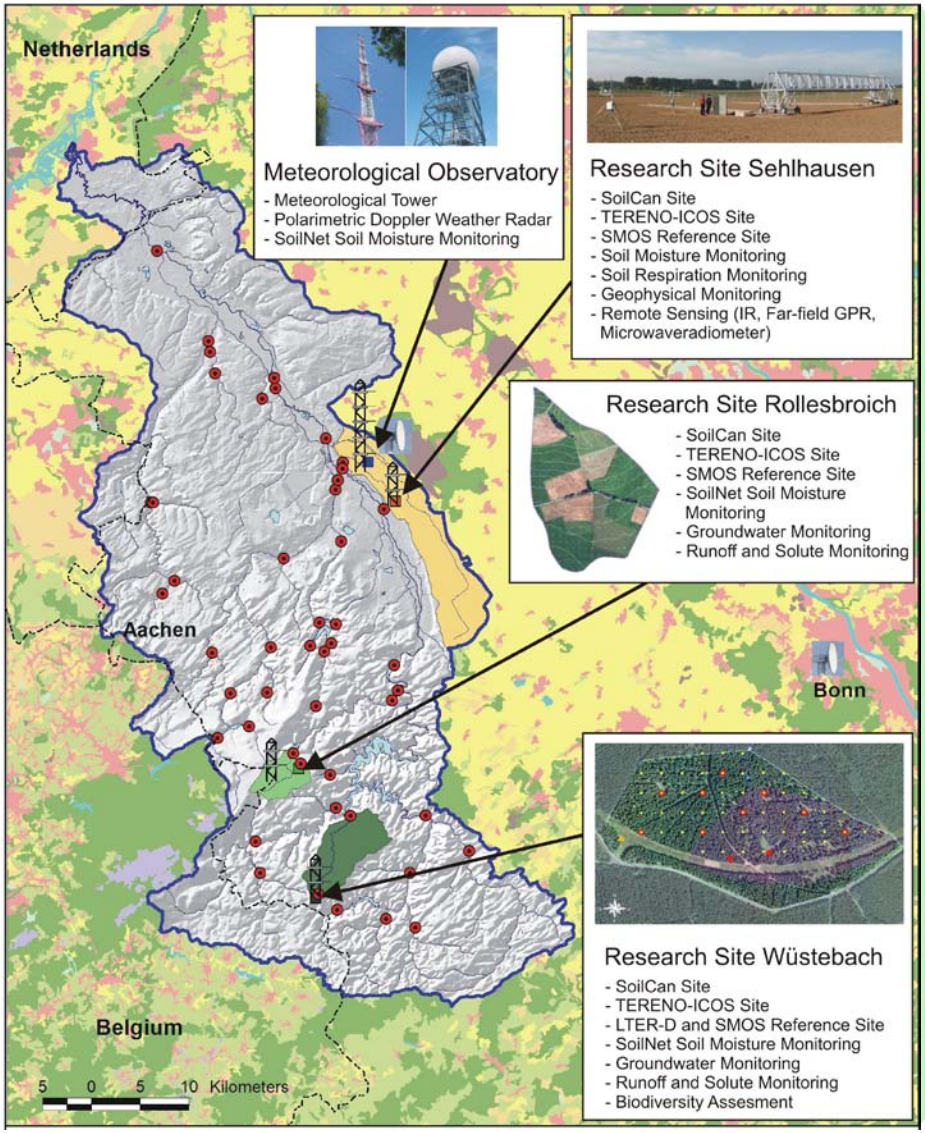
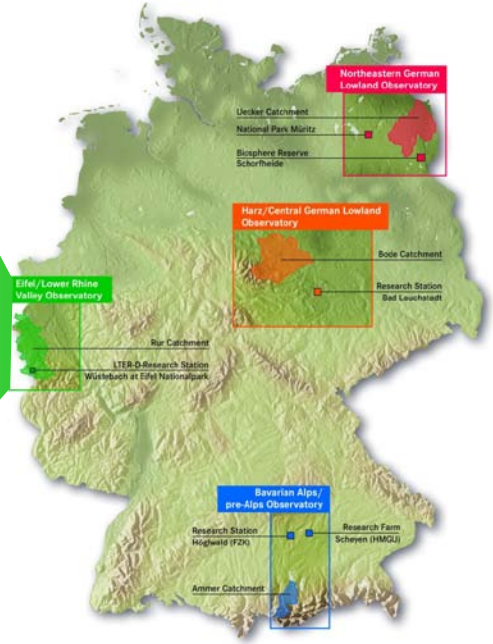


Rur Hydrological Observatory
Ellebach Subbasin
Kall Subbasin
Erkensruhr Subbasin
Waterbodies
Runoff gauging station
Eddy flux tower
Weather Radar



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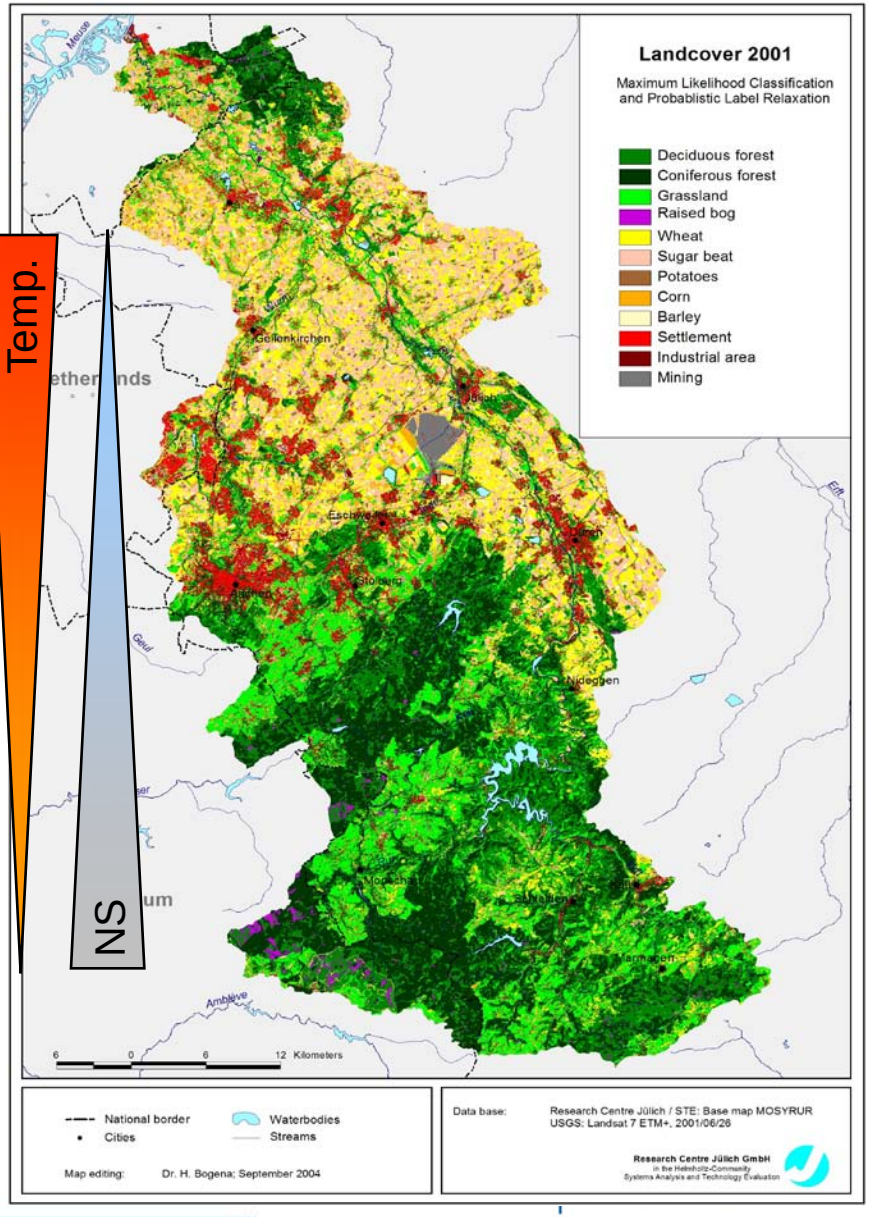
The Rur Catchment

- Distinct Gradients (e.g. Geology, Climate, Landuse, Topography)
- Reference area: National park Eifel
- Dense official monitoring network available
- Close cooperation with the Special Research Area Transregio 32 (DFG):

  „Patterns in Soil-Vegetation-Atmosphere Systems: Monitoring, Modelling and Data Assimilation“



universitätbonn

RWTH RHEINISCH-WESTFÄLISCHE TECHNISCHE HOCHSCHULE AACHEN

University of Cologne

JÜLICH FORSCHUNGSZENTRUM

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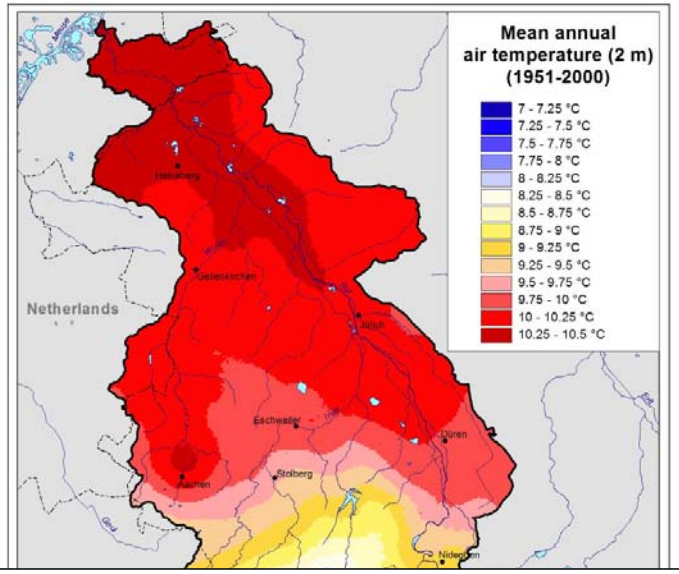
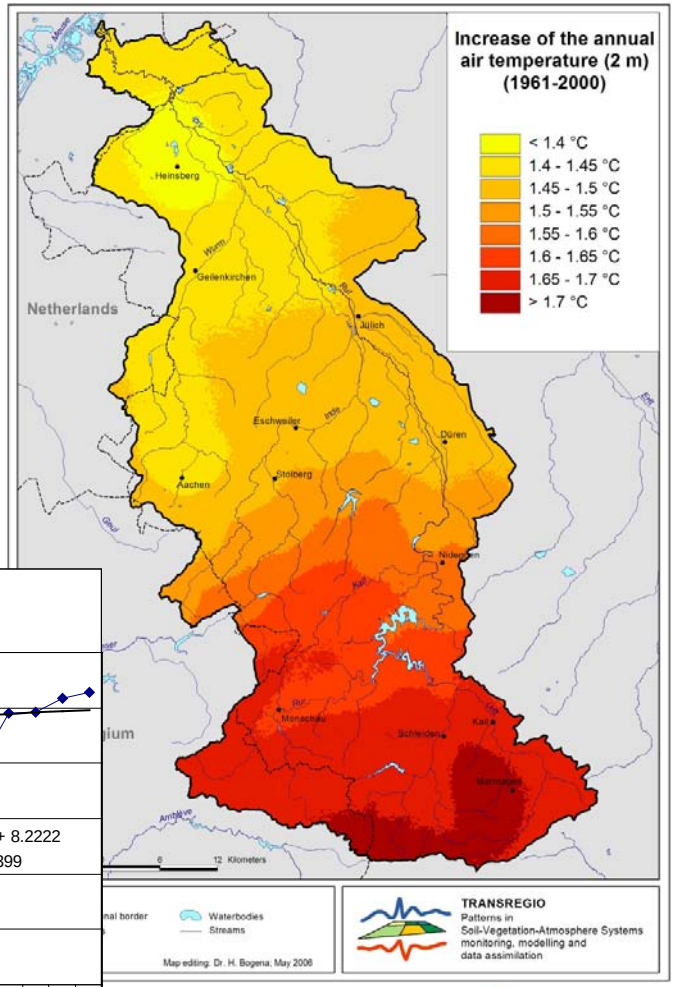
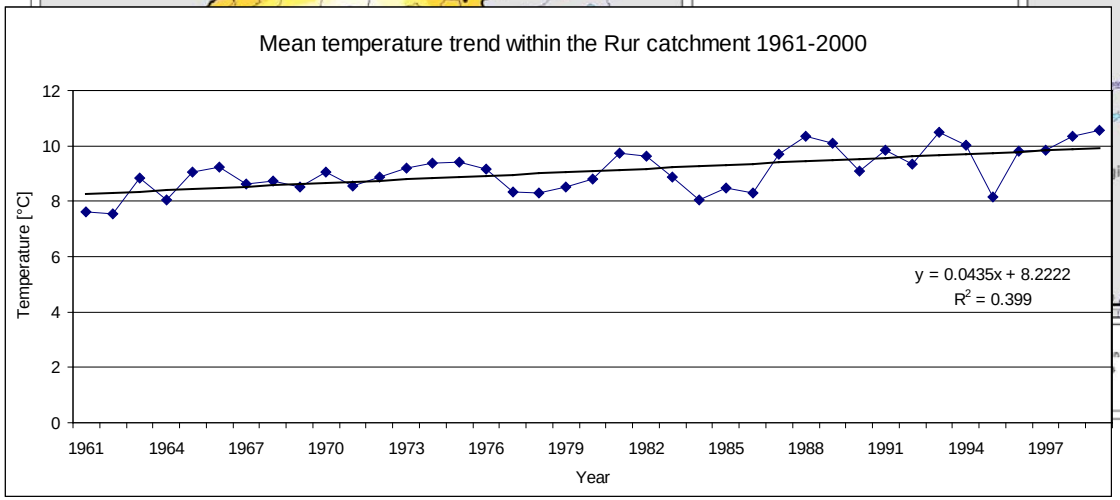
The Rur Catchment – Trends in air temperature







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Specific Research Themes within the Eifel/Lower Rhine Valley Observatory

- Implementation of dedicated experimental platforms to study effects of global change on specific processes in the various compartments of the terrestrial systems such as:
  - Hydrological and pedological processes (water and solute fluxes),
  - Matter dynamics (nutrients as well as pollutants),
  - Trace gas emissions
- Long-term monitoring of exchange processes in the Soil-Vegetation-Atmosphere (SVA) continuum:
  - Analysis SVA patterns and interactions using non-invasive methods
  - Quantification of the influence of small scale structures on larger scales
  - Introduce patterns and structures into SVA models by data assimilation techniques
- Development of upscaling-methods for the determination of effective parameters, fluxes and state variables for different scales

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Selhausen experimental field test site

Research questions:

- How can spatial and temporal patterns of soil state variables like water content and soil temperature be related to evaporation and CO_2 fluxes?
- How can local scale parameters and their spatial variability related with effective field scale model parameters?

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Agricultural test site Sehlhausen

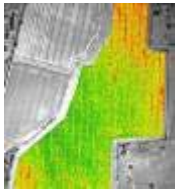
Far-field GPR

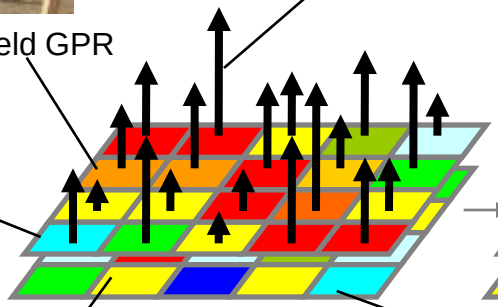
CO_2 Repirations-kammern

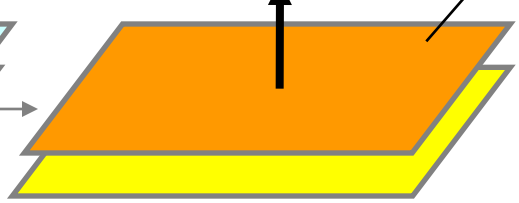
Eddy covariance

Eco-Dimona

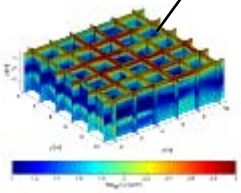
IR-Thermographie







L-band Radiometer



Elektrische Widerstands-tomographie

13.5 m TDR Graben
Temperatur, Wassergehalt, CO_2, Matric potential

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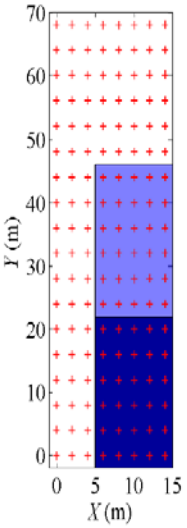
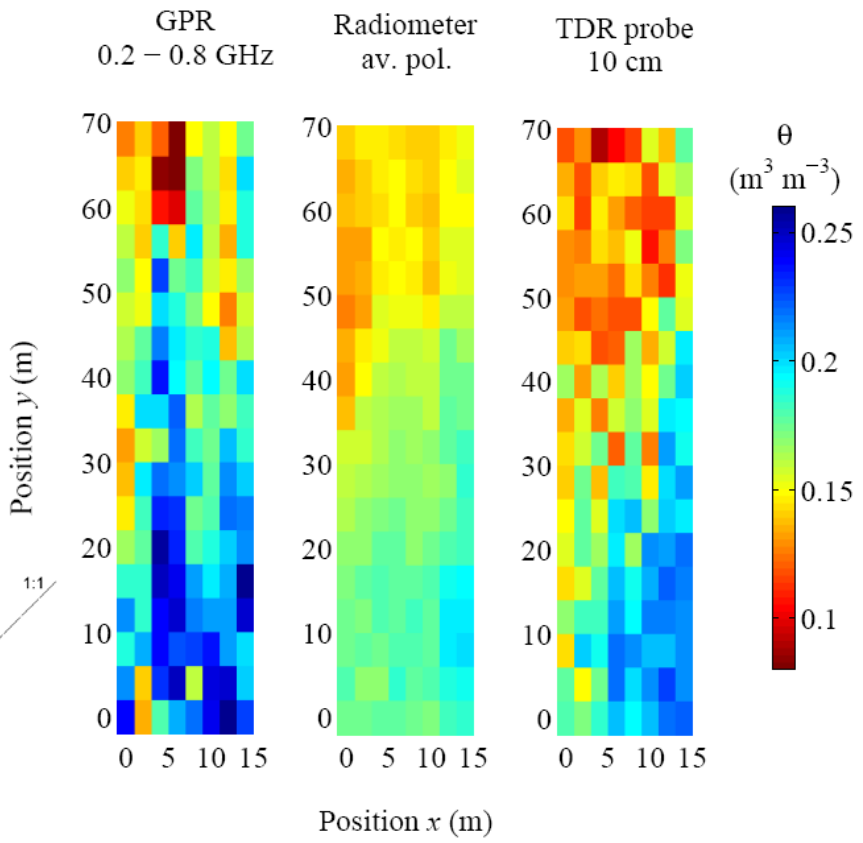
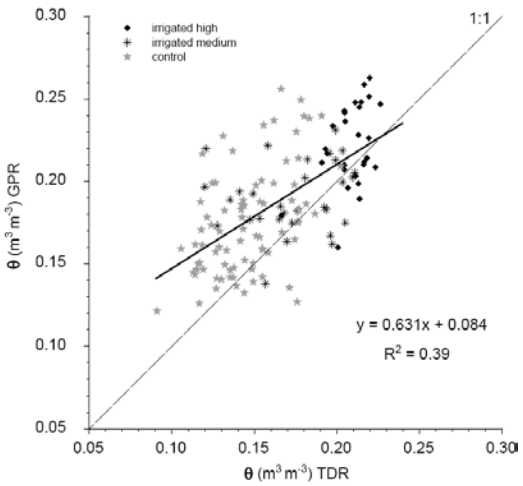
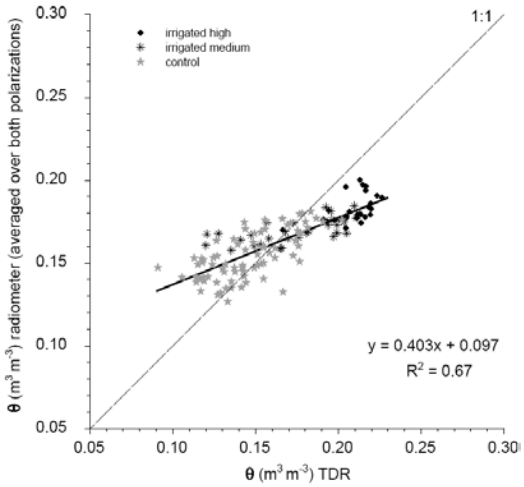
Mapping field scale soil moisture with L-band radiometer and GPR









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From the local to the regional Scale…

global

regional

local

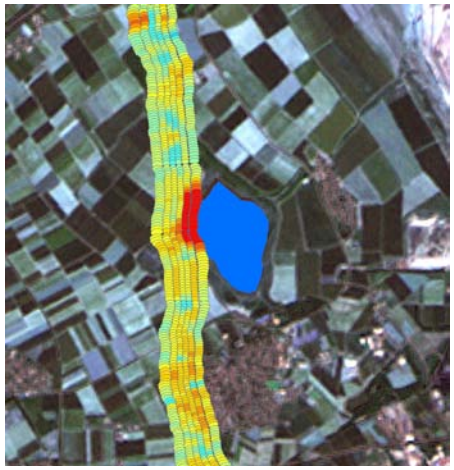
Model based regionalisation

Satellites (e.g. SMOS)

⇒ continuous monitoring

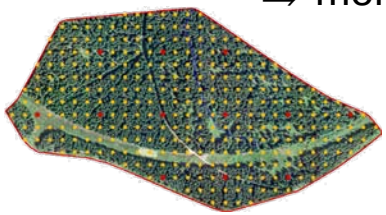
Airborne campaigns

EMIRAD, PLMR, SAR
⇒ momentary imaging



PLMR Rur Campaign 2008

Test sites



Radiometer and Sensor Networks (SoilNet)
⇒ long-term continuous monitoring

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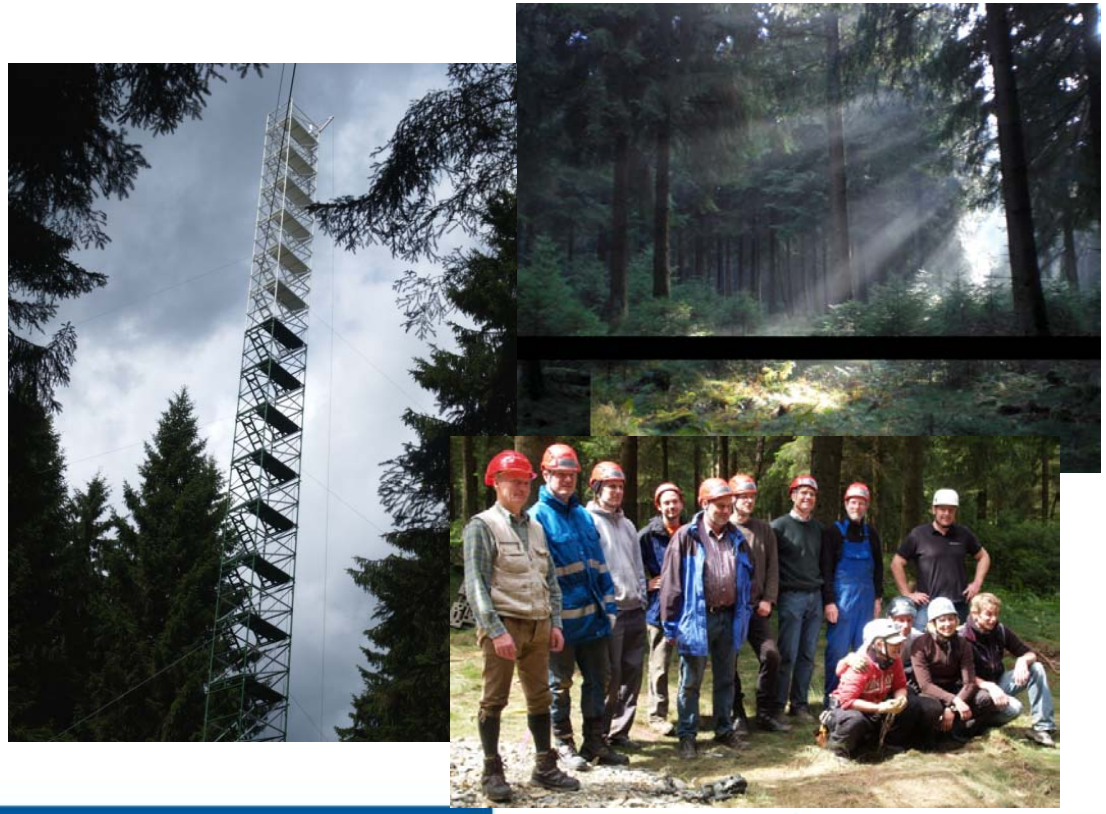
The Wüstebach experimental catchment

Research questions:

- How do soil moisture patterns interact with seasonal and long-term land-atmosphere exchanges of mass and energy?
- How will the combined changes in vegetation, soil moisture and temperature affect the release of carbon from soils?

Approach:

- Long-term carbon budget assessment
- Detailed assessment of catchment properties, state variables and fluxes of water and matter as well as biodiversity
- Exploration of process interactions by modelling water, solute and carbon transport using a coupled ParFlow / SoilCO_2 model scheme



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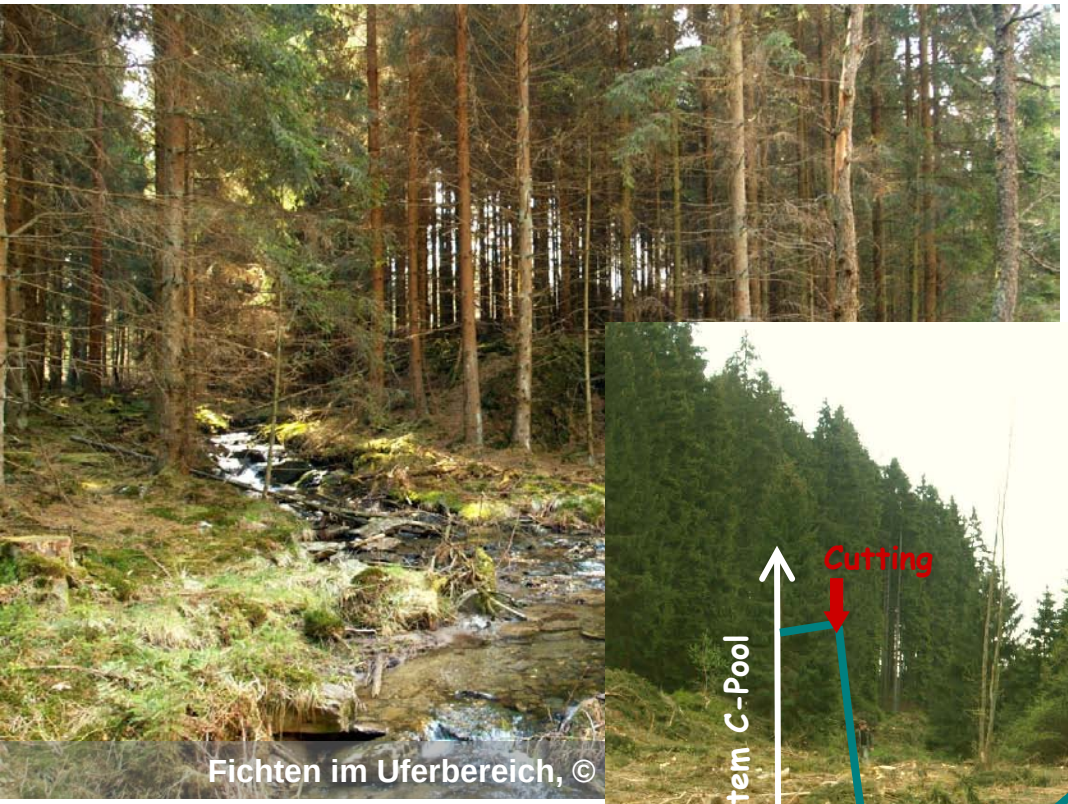
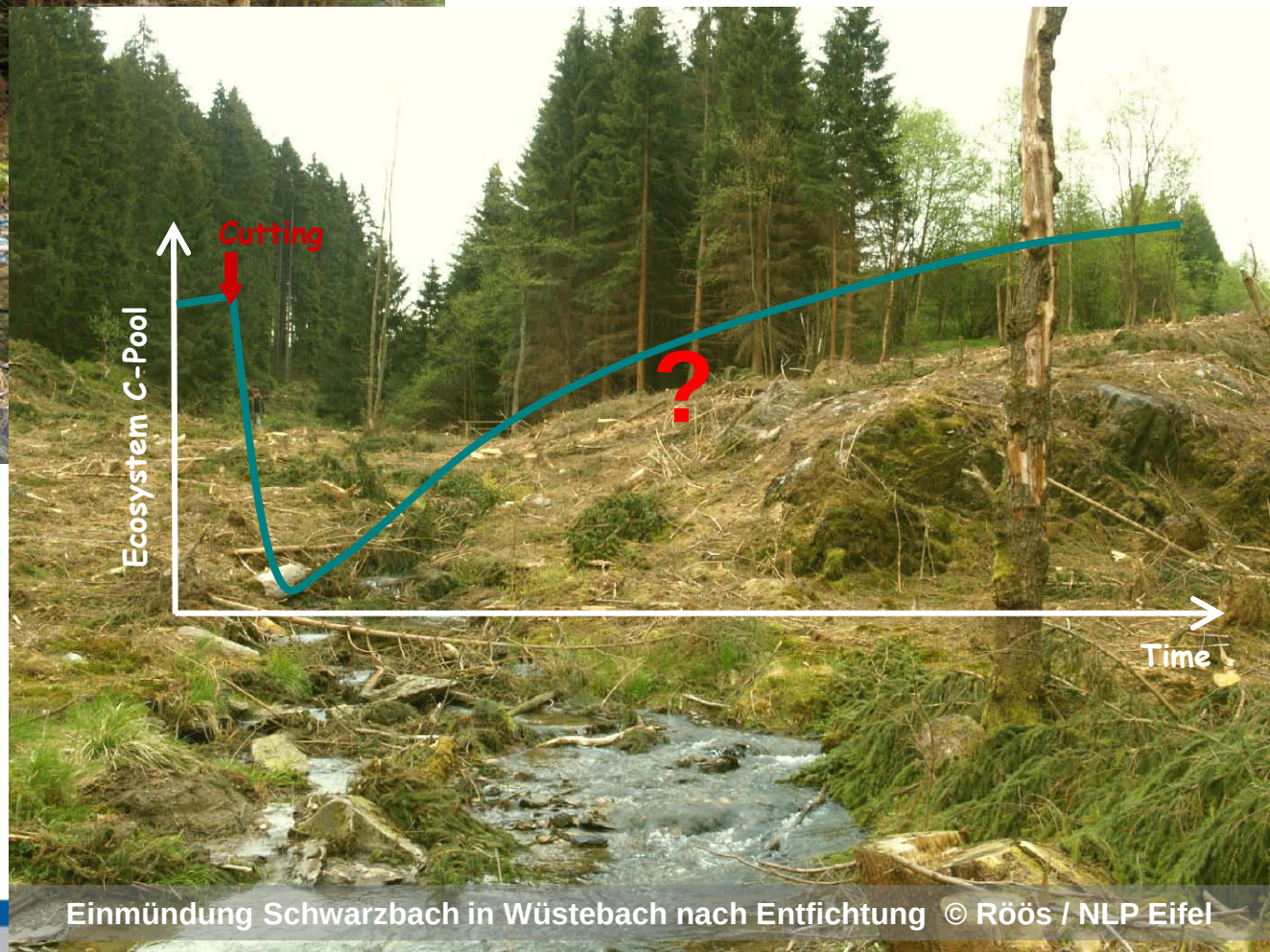
The Wüstebach experimental catchment



Fichten im Uferbereich, ©

after deforestation



Einmündung Schwarzbach in Wüstebach nach Entfichtung © Röös / NLP Eifel

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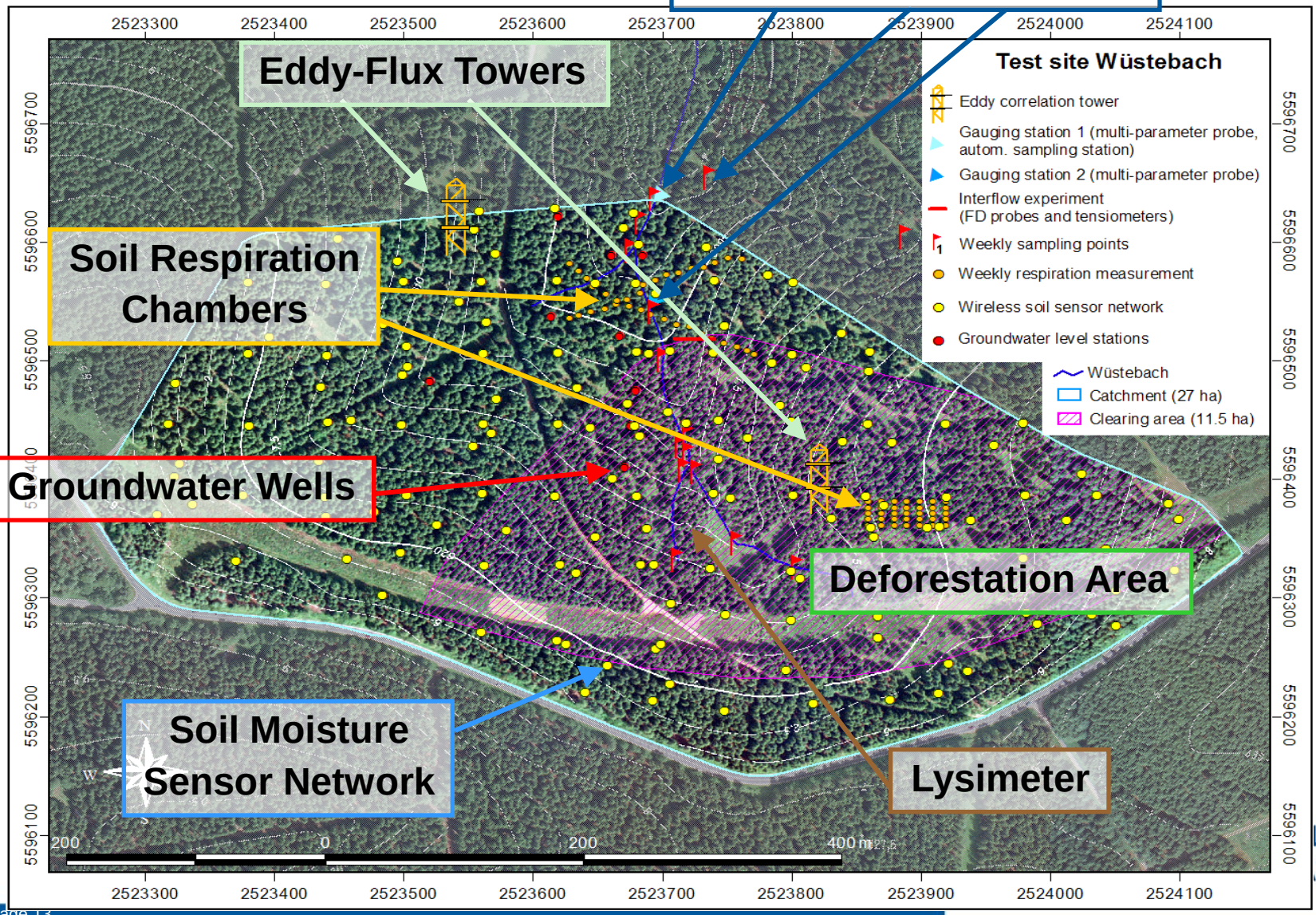
The Wüstebach experimental catchment



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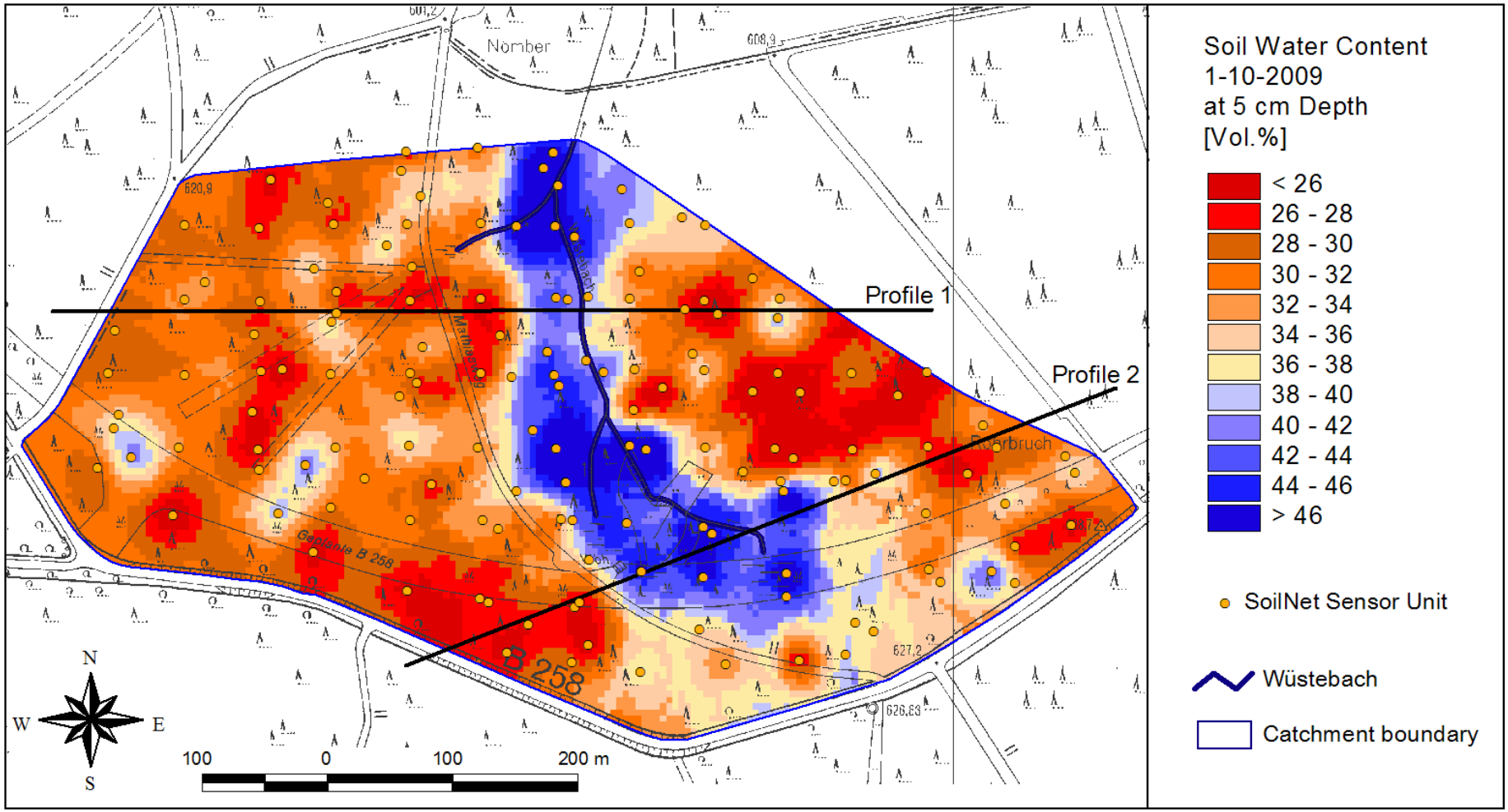
Pre-event soil water content distribution



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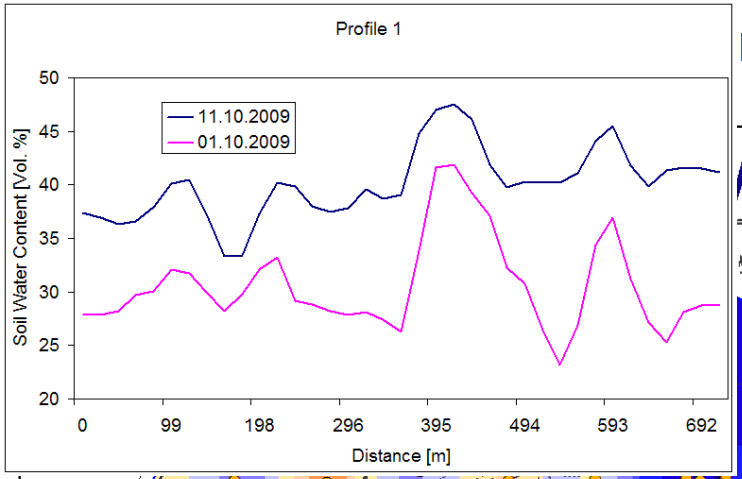

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Opening of the new polarimetric weather radar for regional measurements of precipitation and wind fields

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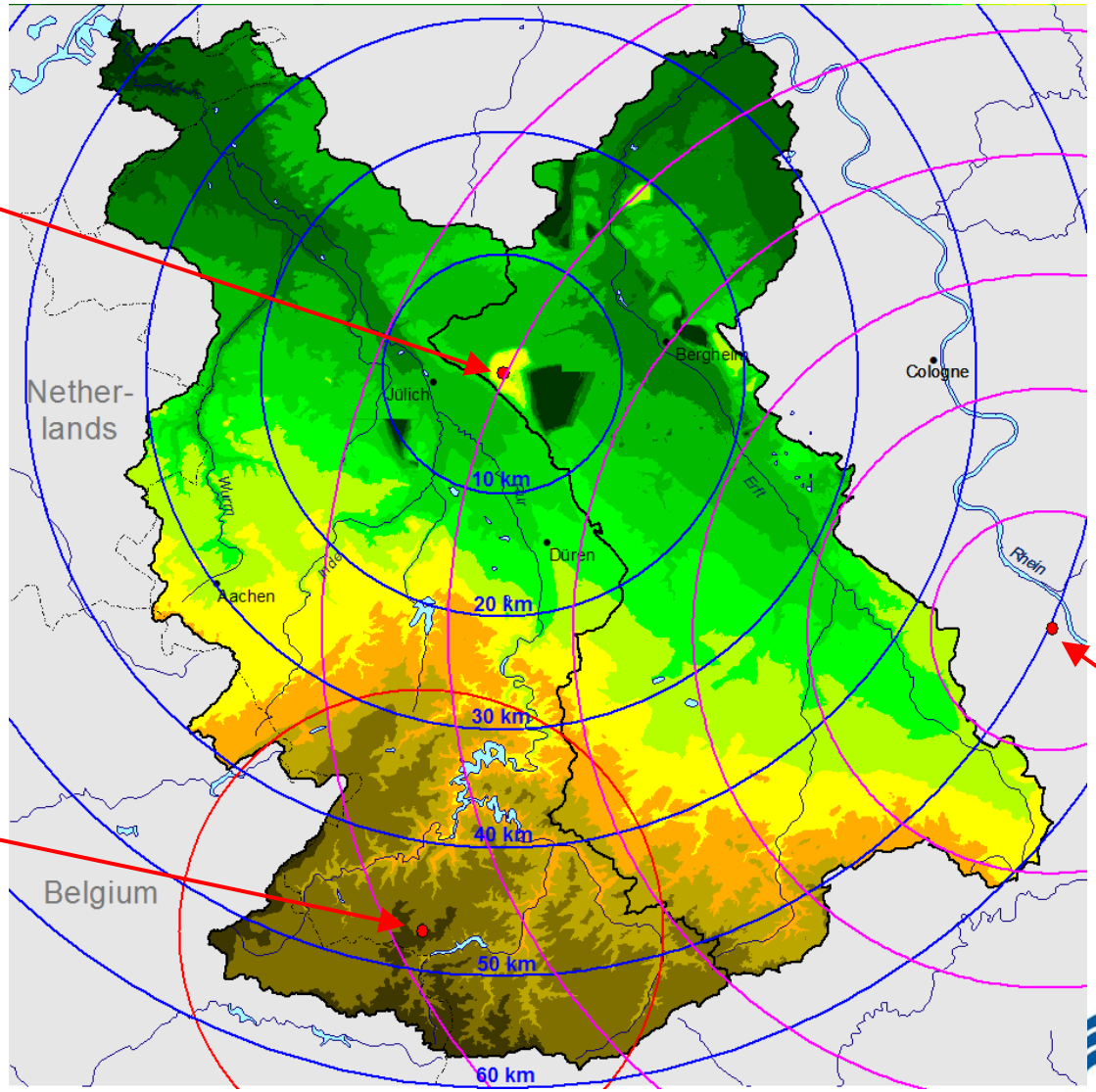
Basin scale weather radar network

X-band polarimetric Doppler-Radar Sophienhöhe

Rainscanner Wüstebach



X-band polarimetric Doppler-Radar Meteorological Institute, Bonn

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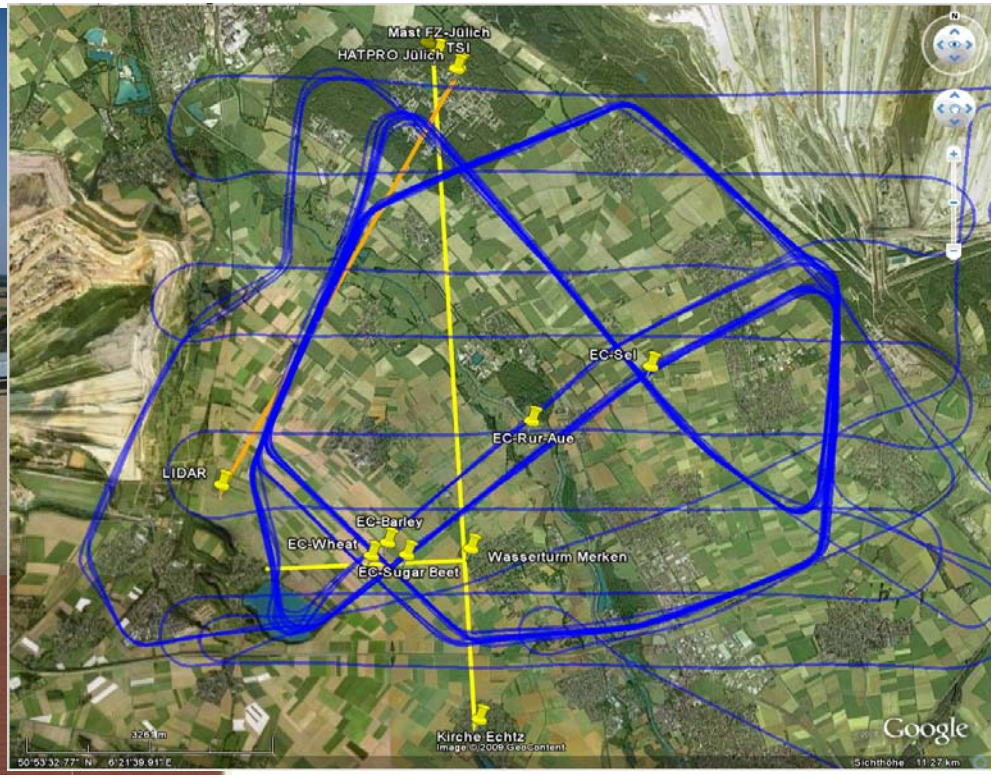
FLUXPAT campaign: Area averaged sensible heat flux measurements using Scintillometers



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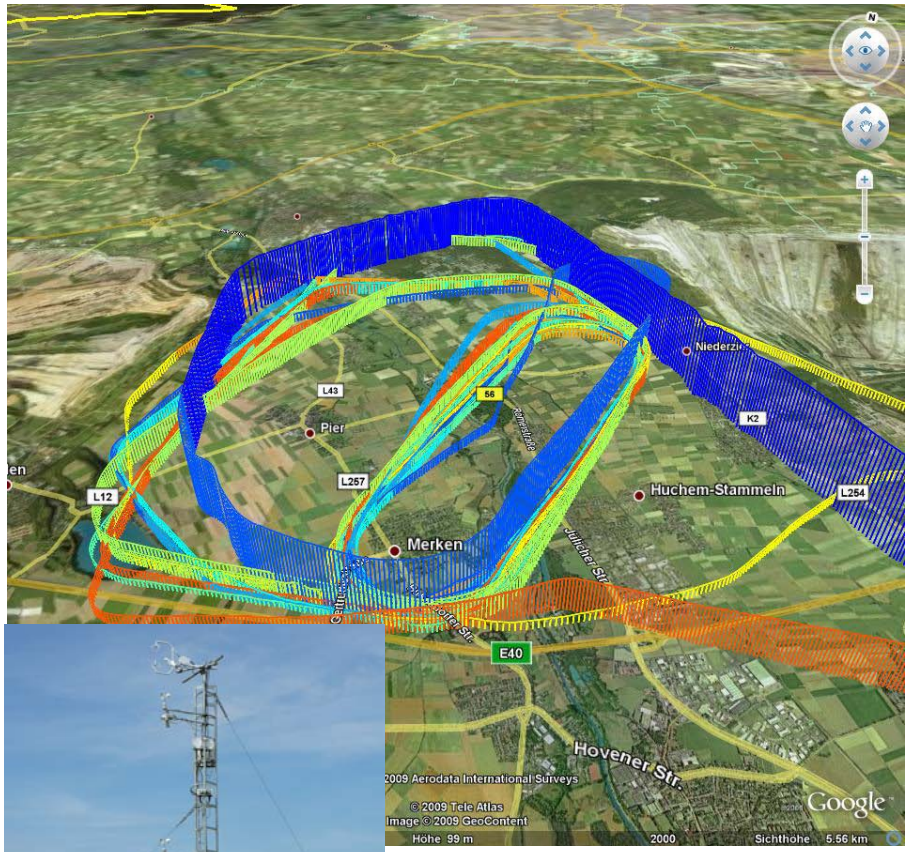
FLUXPAT campaign: Regional Fluxes of vapor and CO_2



3 EC towers for local vapor and CO_2-flux measurements

EcoDimona CO_2-Flux measurement device

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Outreach: TERENO Workshop on Distributed Sensing

TERENO Workshop Distributed Sensing
Juelich, Germany
July 7-9, 2009

Motivation and Modality | Practical Information | Participant Opportunities | Schedule | Registration

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Hands-on Workshop Distributed Sensing: Taking it to the field Forschungszentrum Juelich, Germany, July 7-9, 2009

We invite you to the Hands-on Workshop Distributed Sensing: Taking it to the field in Juelich from 7th to 9th July 2009. This workshop is part of the TERENO (Terrestrial Environmental Observatories) initiative of the Helmholtz Association.

The main objective of the workshop is to provide a benchmark for the technology, including multiple installations of networks of sensing systems, syntheses of the state of the art in each of the critical technological components, and opportunity to take part in formal and casual conversation with practitioners and vendors. Participants will leave the event understanding the state of the art in development, the key design considerations for a sensing network, and hands-on experience with currently deployable systems.

News

Workshop Flyer

Registration to the workshop is open 1 st April 2009

Workshop Organizer

Contact Workshop Organizer

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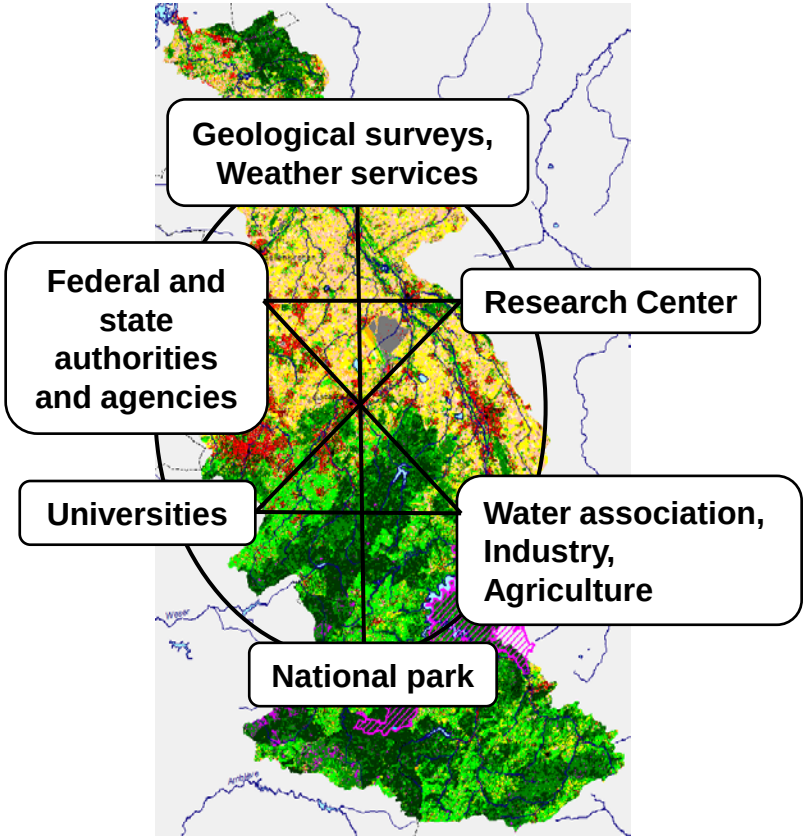
Regional Networking

- University of Bonn
- University of Cologne
- University of Aachen
- University of Trier
- Katholieke Universiteit Leuven (Belgium)
- Université Catholique de Louvain (Belgium)

- Water Associations (WVER, Erftverband)
- National park Eifel
- Agricultural Commission North Rhine Westphalia
- Geological Survey of North Rhine Westphalia
- Ministry for the Environment and Conservation,
- Agriculture and Consumer Protection of North Rhine Westphalia
- Industry partner (e.g. RWE)



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Implementation schedule of the Eifel/Lower Rhine valley Observatory

Work packages	2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Development and deployment of soil moisture sensor networks																
Deployment of runoff gauging stations																
Deployment of Climate stations																
Deployment of standard EC and ICOS-stations																
Deployment of groundwater wells																
Deployment of weather radars																
Accomplishment of air campaigns (soil moisture)																
Deployment water quality stations																
Deployment of isotope laser analyzer																
Geophysical measurements																
Deployment of lysimeter stations (SoilCan)																
Inventory of basic biodiversity data																

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