# Ecosystem Studies within the German network

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TERENO (Terrestrial Environmental Observatories) spans an Earth observation network that extends from the North German lowlands to the Bavarian Alps. This large-scale project aims to monitor the long-term ecological, social and economic impact of global change at regional level. The goal is to provide high quality multi-temporal multi-scale databases for hydrological and terrestrial modeling in order to assess long-term changes in European ecosystems (natural, agricultural, forest,…).
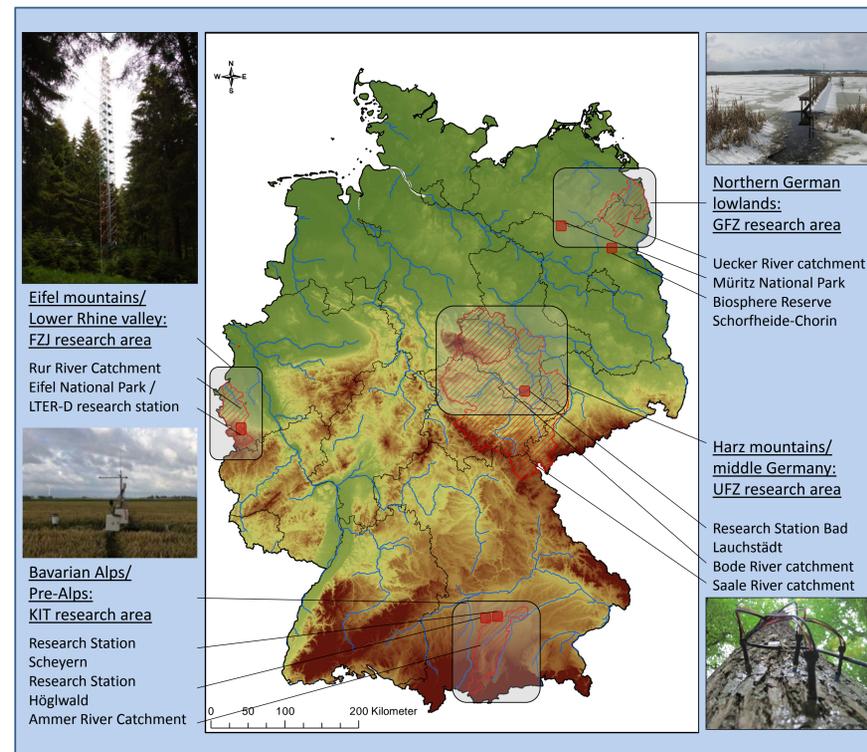
The ecosystem component of TERENO is strongly linked to the European infrastructure project ICOS. Long-term environmental observation areas of the four Helmholtz centers include:

• the exchange of energy, water and trace gases between ecosystems and the atmosphere collocated to environmental variables
• uncertainty quantification and data quality assurance
• validation and development of SVAT and hydrological models

**FZJ** research area: main focus on combining distributed soil moisture and flux measurements in a catchment with high importance of land use change.
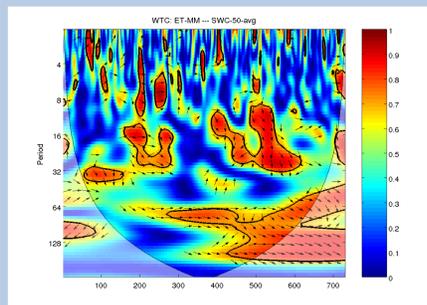


Wavelet coherence analysis based correlation between evapotranspiration and soil moisture for 2 years from 2010-05-01 to 2012-04-30 at the Wüstebach site:
in the first, moister summer (2010) evapotranspiration is hardly affected by soil moisture variablility (energy-limited), whereas in the second summer (2011) evapotranspiartion is obviously water-limited (units on both axes are days).

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Eifel mountains/ Lower Rhine valley: FZJ research area

Rur River Catchment Eifel National Park / LTER-D research station

Northern German lowlands: GFZ research area

Uecker River catchment Müritz National Park Biosphere Reserve Schorfheide-Chorin

Harz mountains/ middle Germany: UFZ research area

Research Station Bad Lauchstädt Bode River catchment Saale River catchment

Bavarian Alps/ Pre-Alps: KIT research area

Research Station Scheyern Research Station Höglwald Ammer River Catchment

**GFZ** research area: main focus on the emission of trace gases (including methane) from wetlands and lakes of the glacially and periglacially formed landscape with multi-scale flux measurements (chambers, eddy covariance and airborne).
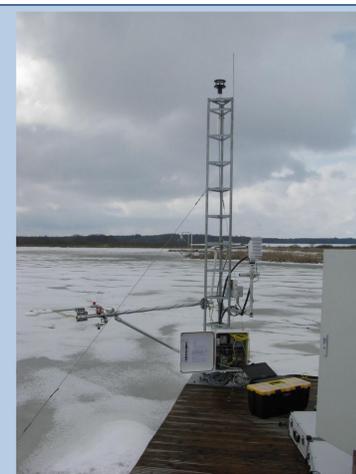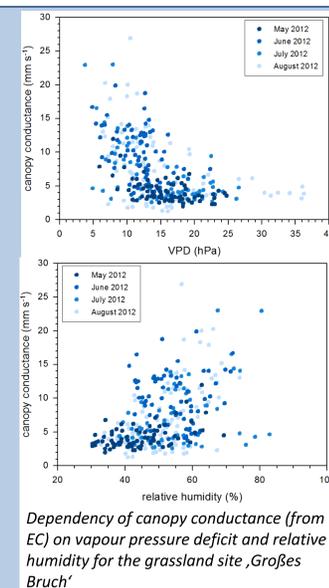


**KIT** research area: High sensitivity of mountainous regions to climate change
Main focus: gradients in climate, and land use; method development and boundary layer processes.
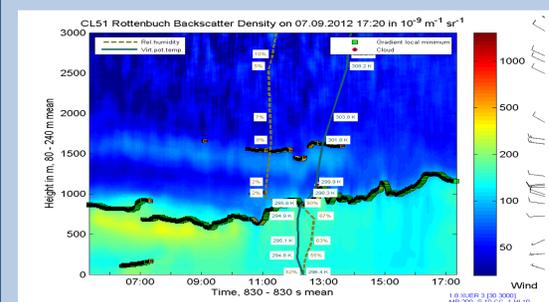


Development of mixed layer height, at the TERENO-Ammer site Rottenbuch, determined from measurements by one of four ceilometers (VAISALA CL51) in the observatory, using the minimum gradient method.

**UFZ** research area:
high intensity of managed areas, large gradients of temperature and precipitation. Main focus on forest ecohydrology, full water balance of different ecosystems (forest, grasland and agriculture) and methane fluxes of moist grassland.
Model development for ecosystem processes.



Dependency of canopy conductance (from EC) on vapour pressure deficit and relative humidity for the grassland site 'Großes Bruch'