Helmholtz Initiative TERENO

**TERENO preAlpine**

**Long-term Observations and Regional Earth System Modelling**

- Support: HGF Large Infrastructures
- Funding decision made in June 2007
- Partners: FZJ, UFZ, HelmholtzZentrum münchen, DLR

**Long-term Vision:**

- core observation and modelling area
- complex & fragmented terrain
- attraction point for partner projects
  - HGF Virtual Institute PROCEMA
  - Priority Progr. HydroChange (pending)
  - European HO-net (pending)
  - HGF/CAS Joint Laboratory ENTRANCE
  - BayFORKAST (pending) ...
TERENO – Longterm Observatory *preAlpine*

**Main Objectives**

Characterization and quantification of climate change effects on

- changes of the coupled C-/N-cycles and C-/N-storage
- biosphere-atmosphere exchange (trace gases/energy flux/albedo)
- vegetation and microbial biodiversity and of the temporal dynamics of matter turnover and exchange associated with this change in biodiversity
- terrestrial hydrology (alpine water budget, precipitation variability, extreme hydrometeorological events (floods/droughts), seepage water quality/quantity, water retention capacity)

in prealpine ecosystems particularly sensitive to changes in climate, nutrient deposition and land use/management (wet grasslands/fens, forests and agricultural systems).
TERENO – Upgrading of long-term observation station Höglwald

Investments:

Agriculture:
- EC system (energy balance, CO₂, H₂O)
- GHG chamber systems (N₂O, NOₓ, CO₂, CH₄)

Ecosystem XXX:
- Climate station

- NH₃-TDLAS

- Water gauges (4) with autosamplers for the quantification of N and C export
TERENO – Climate Feedback Station *Ammer* Catchment

Δ Temp ~ 2.5 °C

Δ Precipitation ~ 500 mm

Graswang ~ 950 asl

Unternogg ~ 850 asl

Weilheim ~ 550 asl

Global Change Experiment

TERENO
TERENO – Climate Feedback Station *Ammer* Catchment

**Investments:**

- Climate station
- EC system (Energy balance, CO₂, H₂O)
- Micro rain radar MRR2
- 36 small lysimeters ~ 2 m³
- GHG chamber system (N₂O, NOₓ, CO₂, CH₄) for flux measurements at lysimeters
- Photometer for the quantification of nitrate export at two existing water gauges
Experimental design of small lysimeters for the simulation of climate change effects

Parameters measured:
- GHG exchange
- NO$\text{}_3$ export
- Water and energy balance
- NO$\text{}_3$/NH$\text{}_4$ concentrations
- Microbial biomass/abundance
- Vegetation

Graswang (GR):
- Control
- Groundwater drawdown
- GR + 1°C – 200mm

Unternogg (UN):
- GR + 1°C – 200mm
- UN + 1.5°C – 300mm

Weilheim:
- GR + 2.5°C – 500mm
- UN + 1.5°C – 300mm

Δ Temp ~ 2.5°C
Δ Niederschlag ~ 500 mm

Control Groundwater drawdown

Graswang ~ 950 asl
Unternogg ~ 850 asl
Weilheim ~ 550 asl

TERENO – Climate Feedback Station Ammer Catchment
Integration of the TERENO Longterm Observatory *preAlpine* in current projects/networks

1. „Messnetz 2000“ (German Weather Service)
2. NitroEurope IP (EU)
3. PROCEMA (Helmholtz Virtual Institute): "Regional Precipitation Observation by Cellular Network Microwave Attenuation and Application to Water Resources Management“
4. DFG-PP „Hydrological Change“ (submitted)
5. Helmholtz-Chinese Academy of Sciences Joint Laboratory ENTRANCE
6. Climate Programme Bavaria 2020: BayFORKAST (submitted, pending)

In general, **TERENO** observatories are an open platform and intend to establish new and extend existing national and international scientific cooperations!