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TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

TERENO General Overview – Status, Network Activities, Accessibility and International Integration

H. Vereecken and the TERENO team

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Next meeting; 2018- ten years TERENO

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Abstract Submission is Open!!

Organizational Workshop – International Soil Modeling Consortium (ISMC)
Austin, Texas, USA

Tuesday, 29 March – Friday, 1 April 2016

Conference Information and Abstract Submission
Information on the workshop can be found at the following website:
https://www.soil-modeling.org/austin-workshop

Abstract submission:
https://ismcworkshop.eventbrite.com

Goals of this Workshop:
To solidify the concept and operation of an international soil modelling consortium (ISMC), by bringing together leading experts in modelling soil processes across disciplines, organizations and institutions; addressing major scientific gaps in describing key soil processes and their long term ecosystem impacts; and identifying interactions with other relevant modeling platforms and scientific communities. More information on the ISMC effort can be found at our webpage: https://www.soil-modeling.org/

Workshop Organization:
Workshop will take place over ~2.5 days, including organizational meetings. Topics across 6 technical sessions include:

- Session 1: Soil processes and climate models
- Session 2: Quantifying and predicting soil ecosystem services
- Session 3: Dealing with heterogeneity and uncertainty
- Session 4: Soil biodiversity, biology and biophysics across scales
- Session 5: Modelling hydrological and biogeochemical processes across scales
- Session 6: Soil mapping, sensing, and soil modelling across scales

An outstanding group of invited speakers are attending, two for each session, to be augmented by additional oral and poster presentations. See the list here: https://www.soil-modeling.org/austin-workshop/invited-speakers

Meeting Organizers:
Harry Vereecken, Jan Vanderborght, Andrea Schnepf, Ralf Kunkel: Forschungszentrum Juelich GmbH
Michael Young, Valerie Siewert: The University of Texas at Austin

Meeting Location:
The workshop will be held at the Commons Learning Center at The University of Texas at Austin, one of the largest universities in the United State. Austin is a beautiful and vibrant city with ample restaurants, music, and outdoor activities. March and April are excellent times to visit Austin. Opportunities to sample the richness of central Texas will be added to the workshop schedule.

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New TERENO faces

Last year Prof. Remko Uijlenhoet became member of the TERENO advisory board

This year Prof. Bruno Merz became member of the TERENO SSC board

This year Ingo Heinrich and Ralf Kiese became members of the TERENO coordination board

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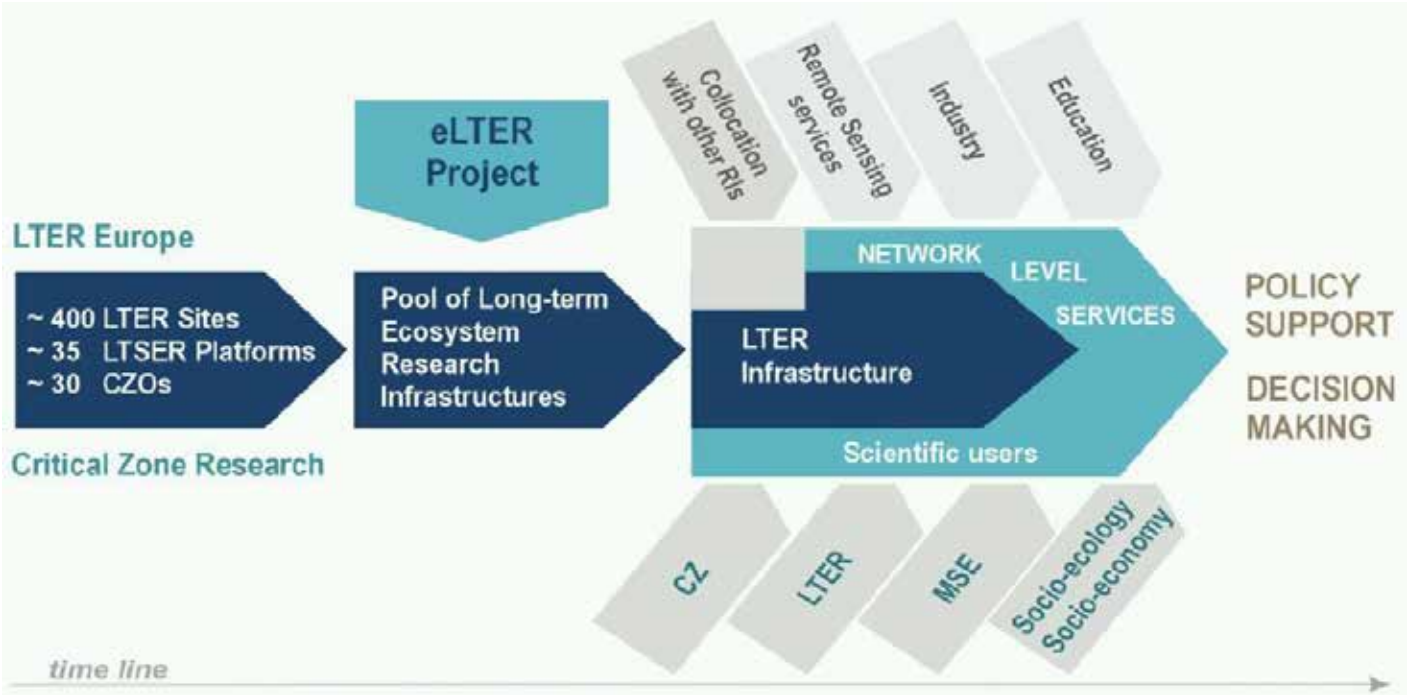
Horizon 2020 project eLTER

H2020 eLTER
Integrated European long-term ecosystem, critical zone & socio-ecological system research infrastructure

Started this year (runtime: 2015-2019)

Aim: Advancing a pool of long-term ecoystem research infrastructures into a mature LTER Infrastructure with network level services to support multiple use



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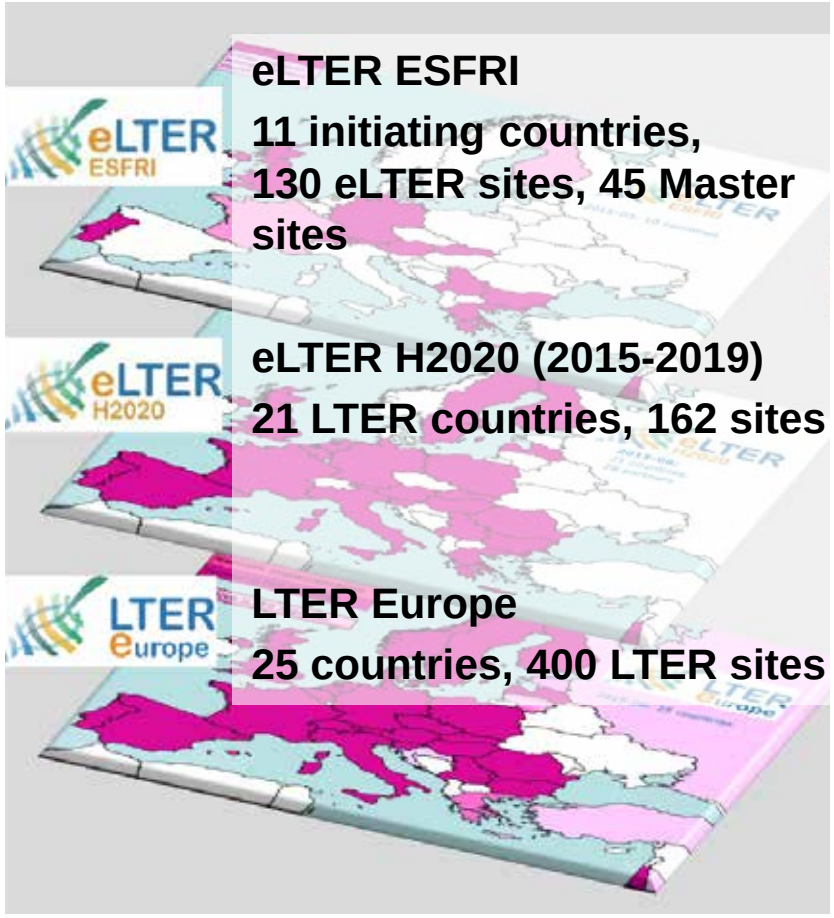
eLTER-ESFRI – Integrated European Long-term Ecosystem Research Infrastructure



- **Generic research infrastructure** offering basic **services** and baseline activities
- **Harmonized action** of formerly less coordinated elements, enabling new research quality
- **Central steering PLUS adaptive maneuvers** of individual elements
- **Mid- and long-term planning** in close interactions with strategic processes and other RIs

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ICOS-D

ICOS integrated carbon observation system
A European infrastructure dedicated to high precision monitoring of greenhouse gas fluxes

- First implementation phase of ICOS-D completed
- Additional BMBF funding to achieve ICOS 1 class standard:

  ~1 Mio. € (2016)
- 3 TERENO observatories are included in the ICOS network

vTI Johann Heinrich von Thünen-Institut

TECHNISCHE UNIVERSITÄT DRESDEN

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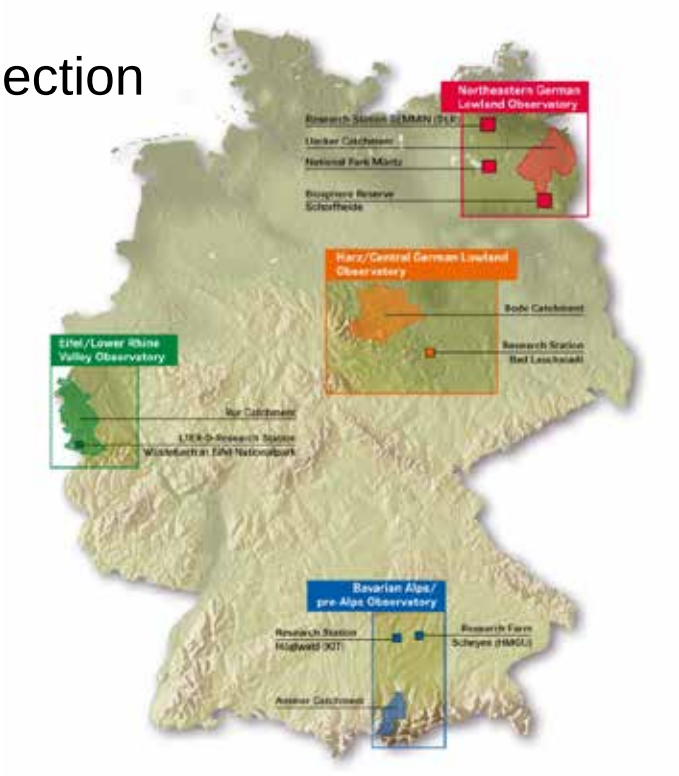
TERENO phd-fellowships

- Fellowships will start in 2016 and will be awarded for up to 3 years
- International call for proposals
- TERENO Advisory Board will support the selection
- Research at least at two observatories
- At least two PIs from different institutions
- Universities can also participate
- Funding through budget resources



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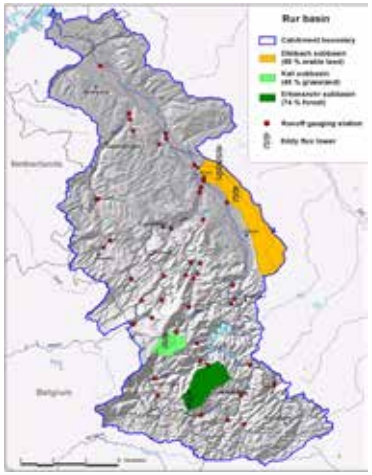
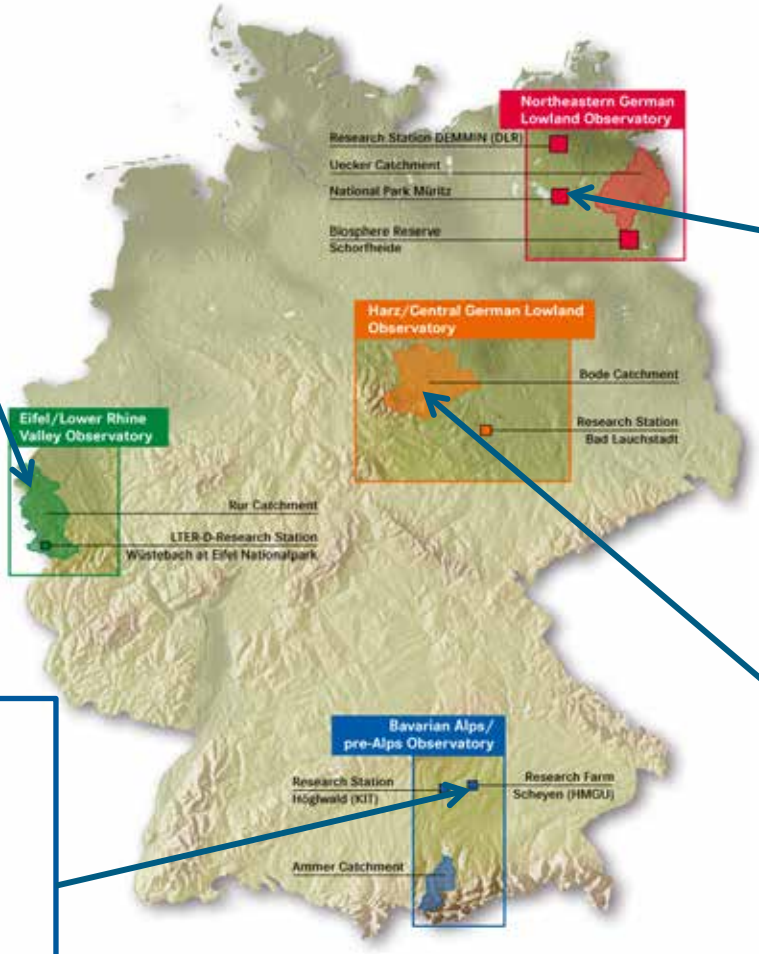
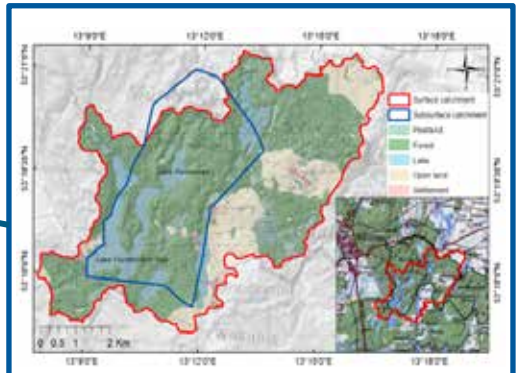
CZEN
Critical Zone Exploration Network

6 CZOs established within TERENO

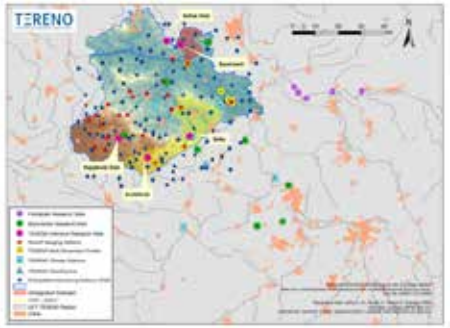


- Ellebach CZO
- Kall CZO
- Erkensruhr CZO

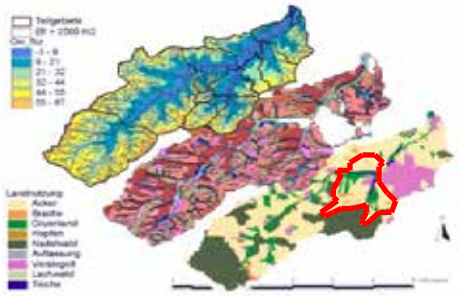




Fuerstensee CZO



Selke CZO



Scheyern/Schnatterbach CZO

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Sino-German CZO Symposium in Nanjing, P.R. China

- Discussion on the design of CZOs and common research questions that may serve as a basis for the establishment of CZOs in Germany and China
- Exchange between German and Chinese scientists in the establishment of international networks of CZOs
- Discussion on possible funding possibilities for projects, e.g. joint research groups, international graduate school, EU-H2020.

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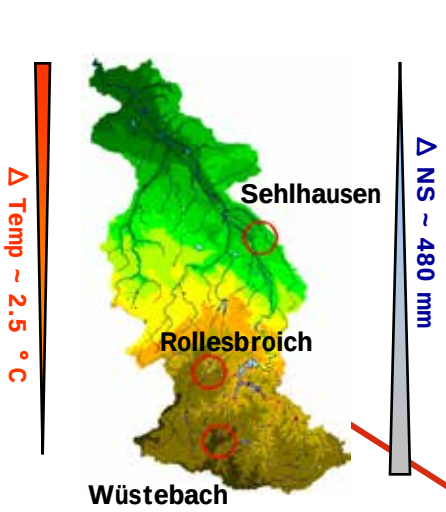
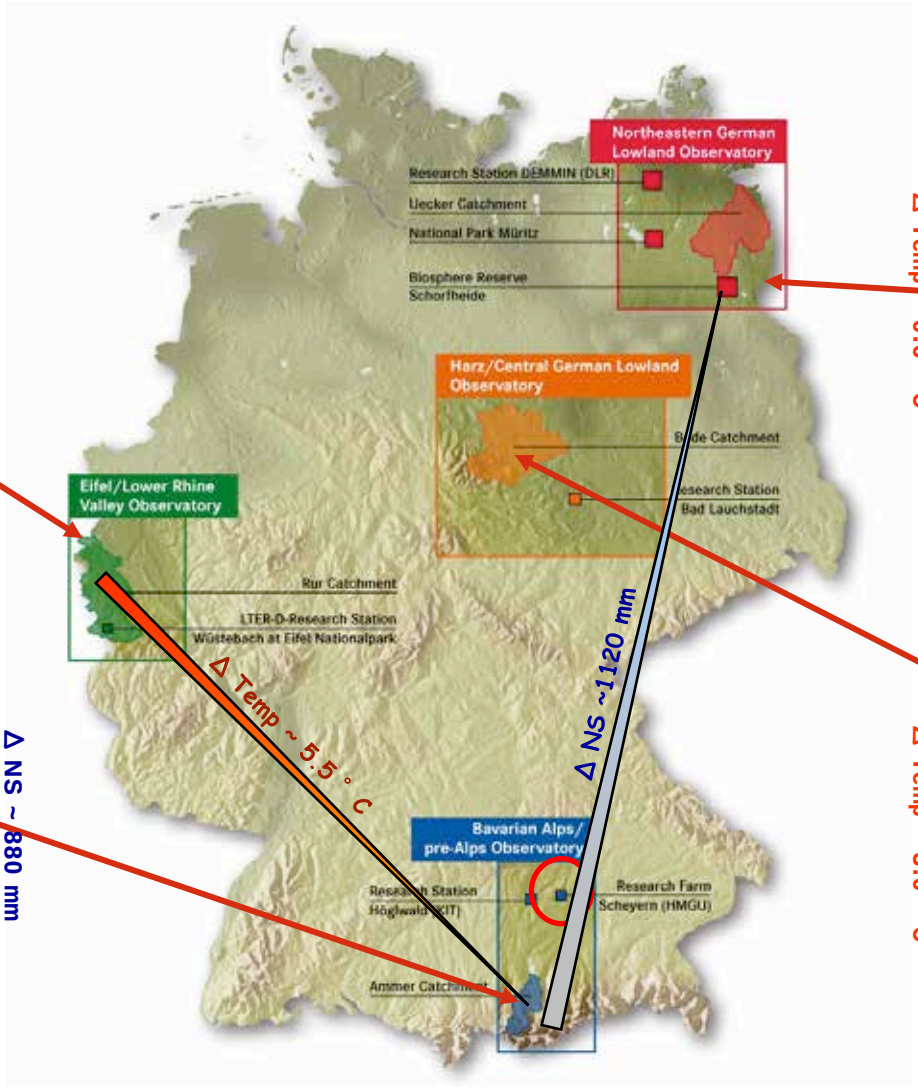
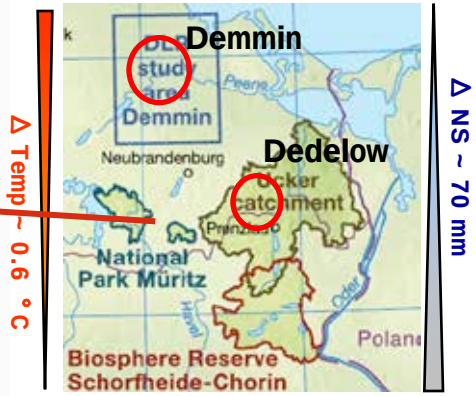
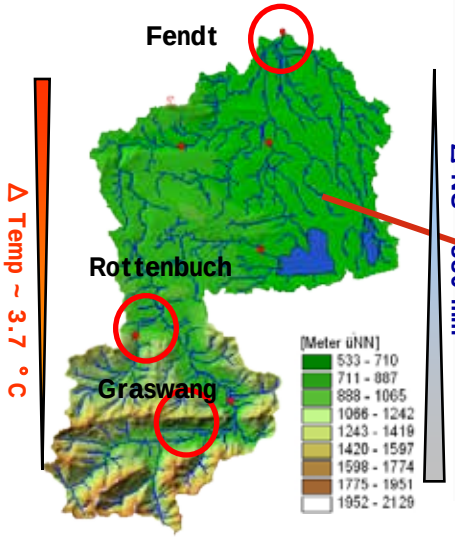
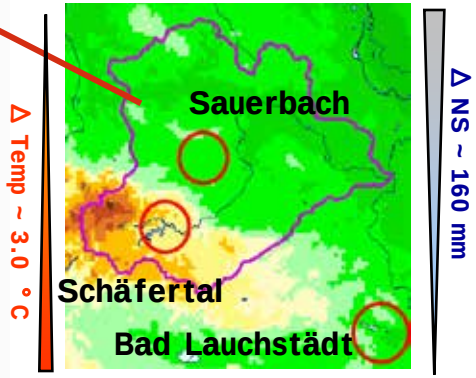
TERENO SoilCan: Tracer experiment











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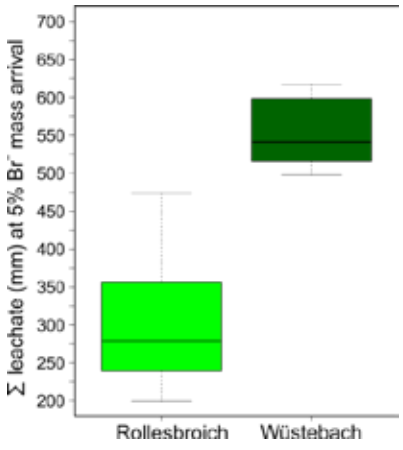
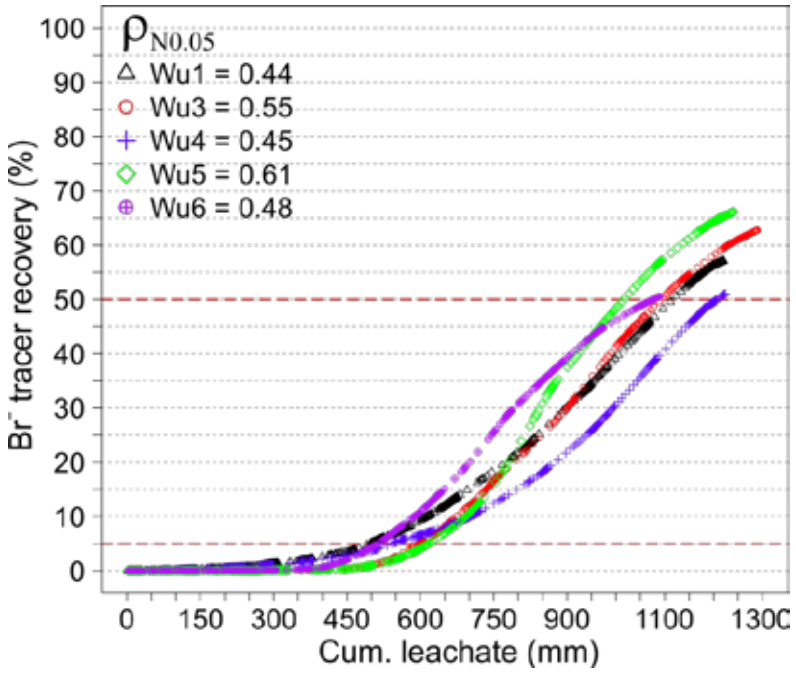
TERENO SoilCan: Tracer experiment

- Bromide tracer applied Dec. 2013 at 62 lysimeters of HMGU, ZALF, UFZ and FZJ
- Stable water isotopes measured at 40 lysimeter
- Soil water sampling at four depths



First results Br^- tracer:

- Br^- plant uptake of grassland depends on land use and plant community type
- High heterogeneity flow paths in soils
- Preferential flow indicator relative 5% arrival time (e.g. Wüstebach)



Outlook:

- Investigation of preferential transport under transient hydrological conditions

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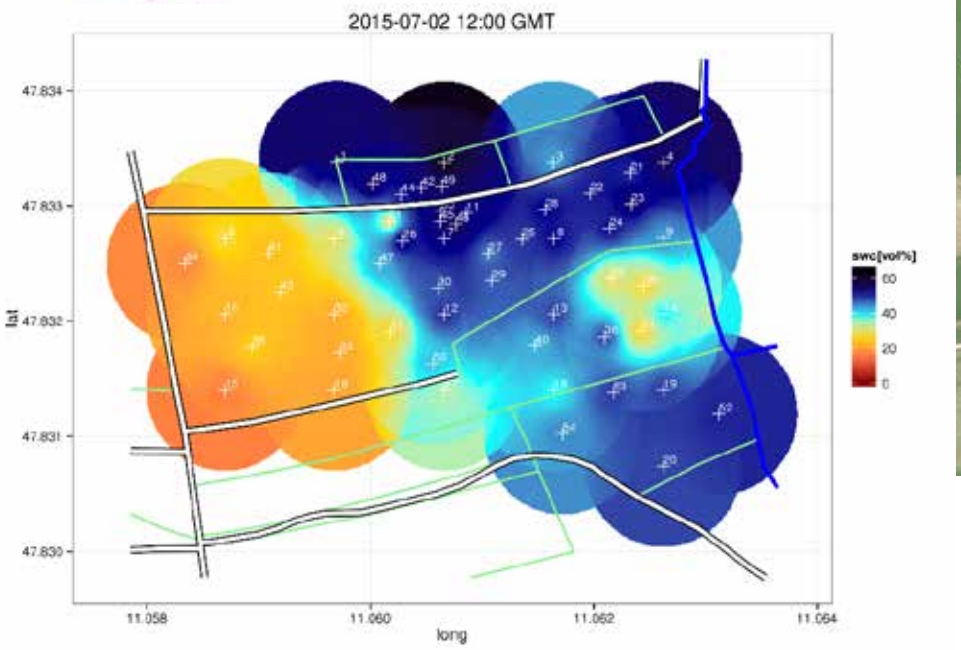
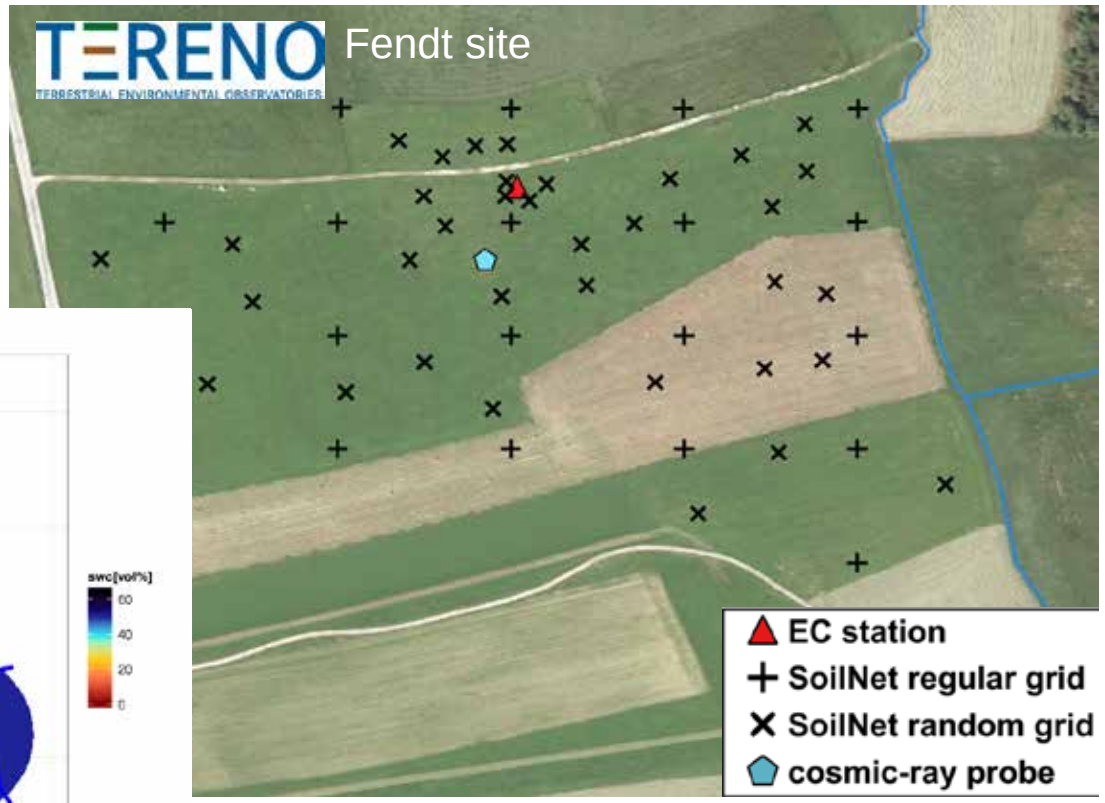
New SoilNet sensor network installation at Prealpine / Alpine Observatory (Fendt site)





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Quantification of N_2O and CH_4 emissions and nutrient budgets at TERENO site Fendt

In montane grasslands climate change

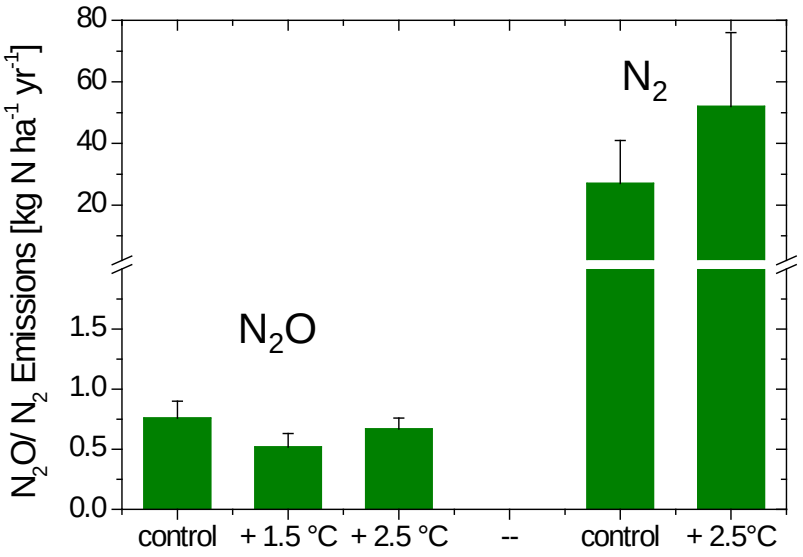
- increase soil CH_4 uptake
- does not effect soil N_2O emissions
- since mainly N_2 emissions increase
- slightly increase N leaching and plant uptake

à **Novel multi-year measurements are essential**

a) to assess site specific GHG and nutrient budgets,

b) to better understand processes and drivers and

c) for comprehensive model testing and validation



Chen et al., 2015; Lu et al., in prep; Fu et al. in prep; Unteregelsbacher et al., 2013

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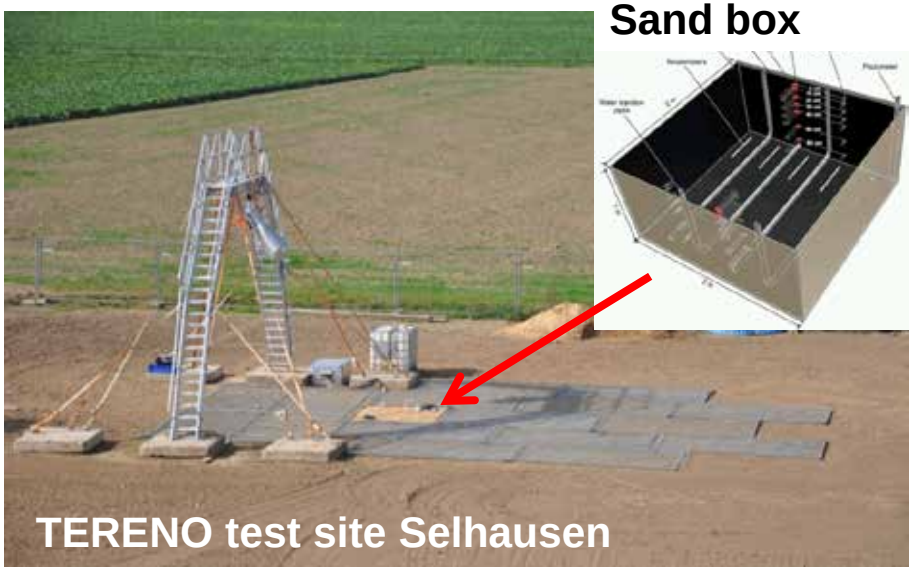
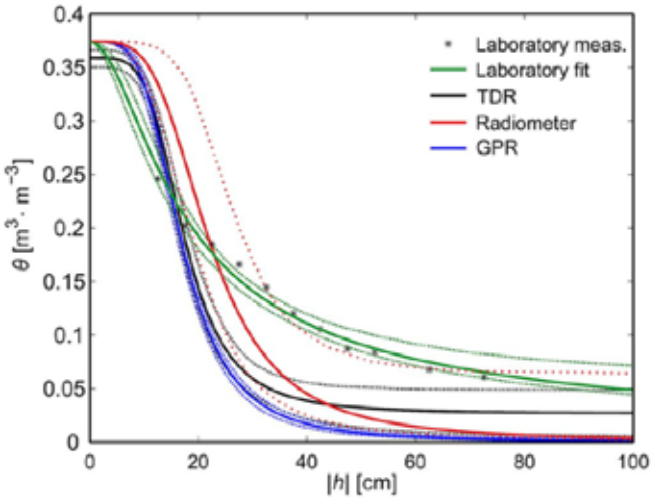
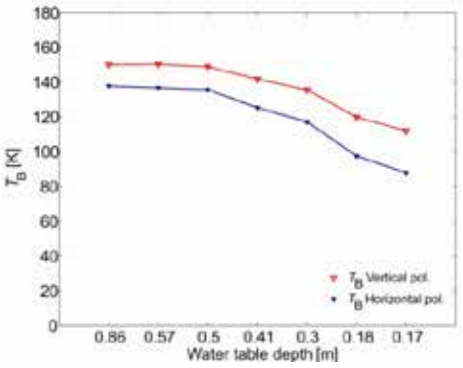
Inverse modeling of soil moisture and soil hydraulic properties from passive and active measurements

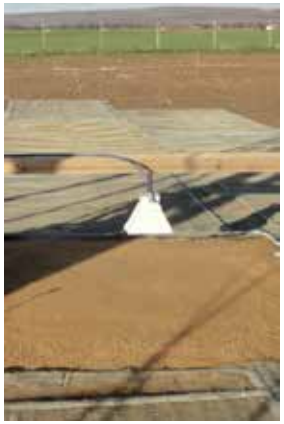


Estimation of MvG water retention curves

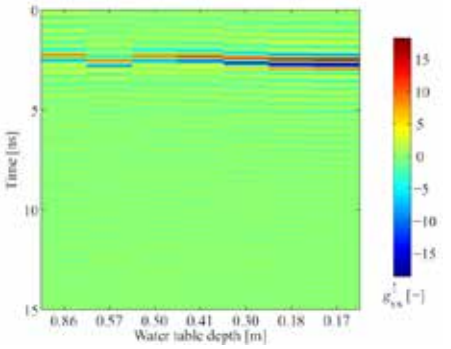


Radiometer





GPR



Jonard et al., 2015,
IEEE Trans. Geosci. Remote Sens.

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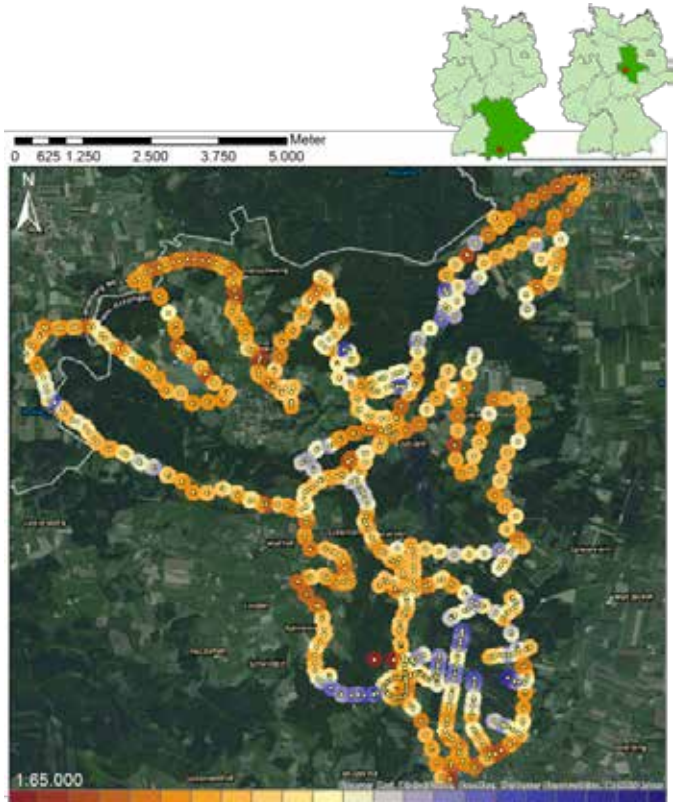
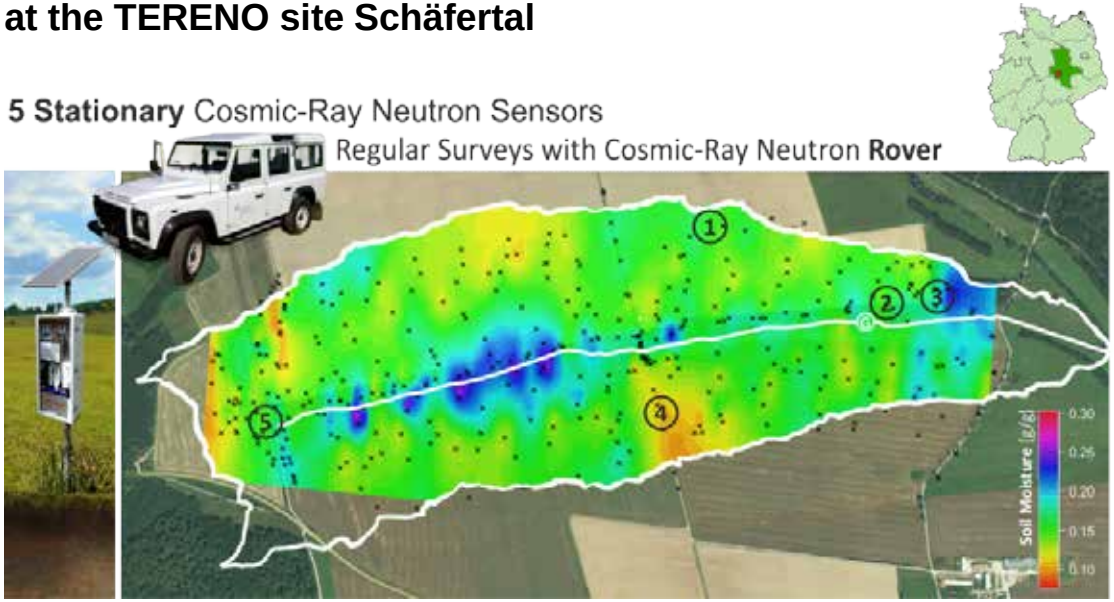
Mobile Cosmic Ray Soil Moisture Sensing with the TERENO:ROVER

Joint Remote Sensing Evaluation Campaign ScaleX
(KIT, UFZ, DLR, DWD, LMU Munich, University of Alberta)



Neutron counts (cph)

Investigation of small-scale patterns and catchment dynamics at the TERENO site Schäfertal



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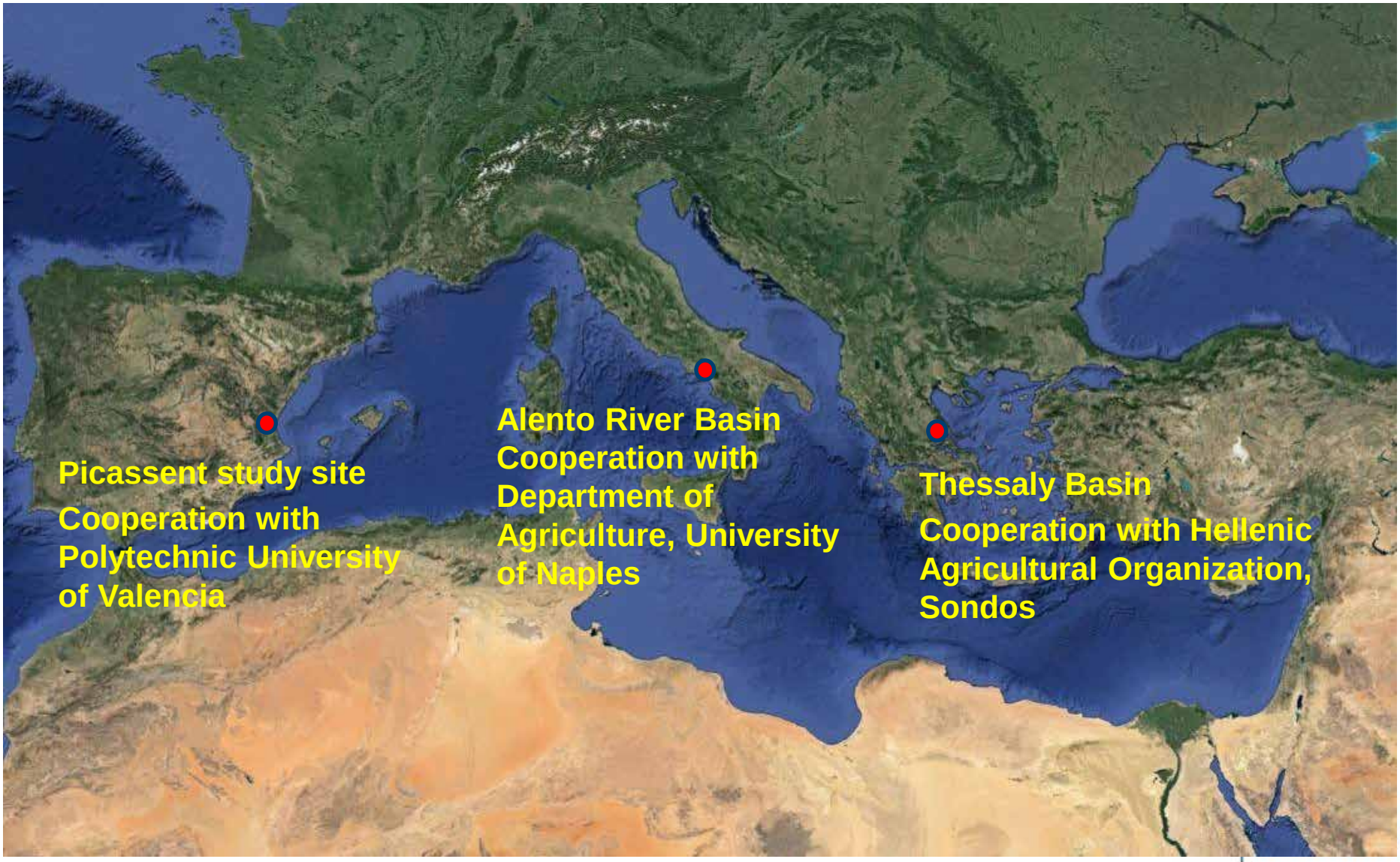
Activities in the Mediterranean



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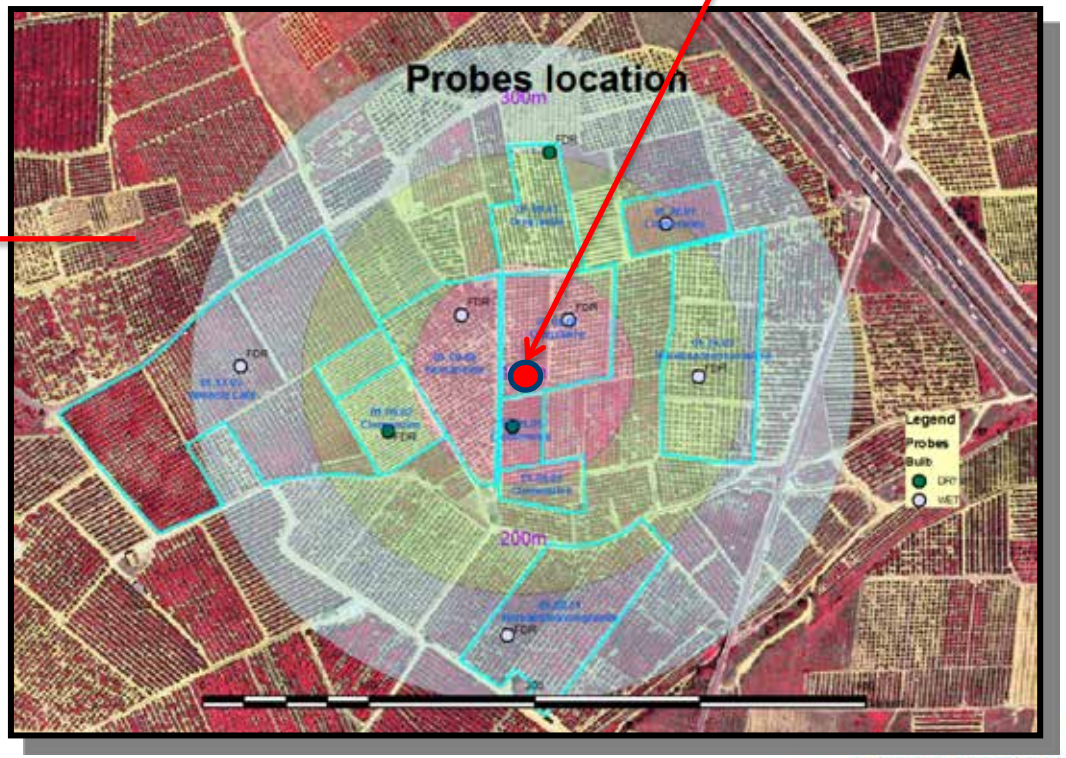
Picassent study site, Valencia, Spain

Development of a irrigation management system for Citrus production using Cosmic-ray Probes



Cooperation with Polytechnic University of Valencia

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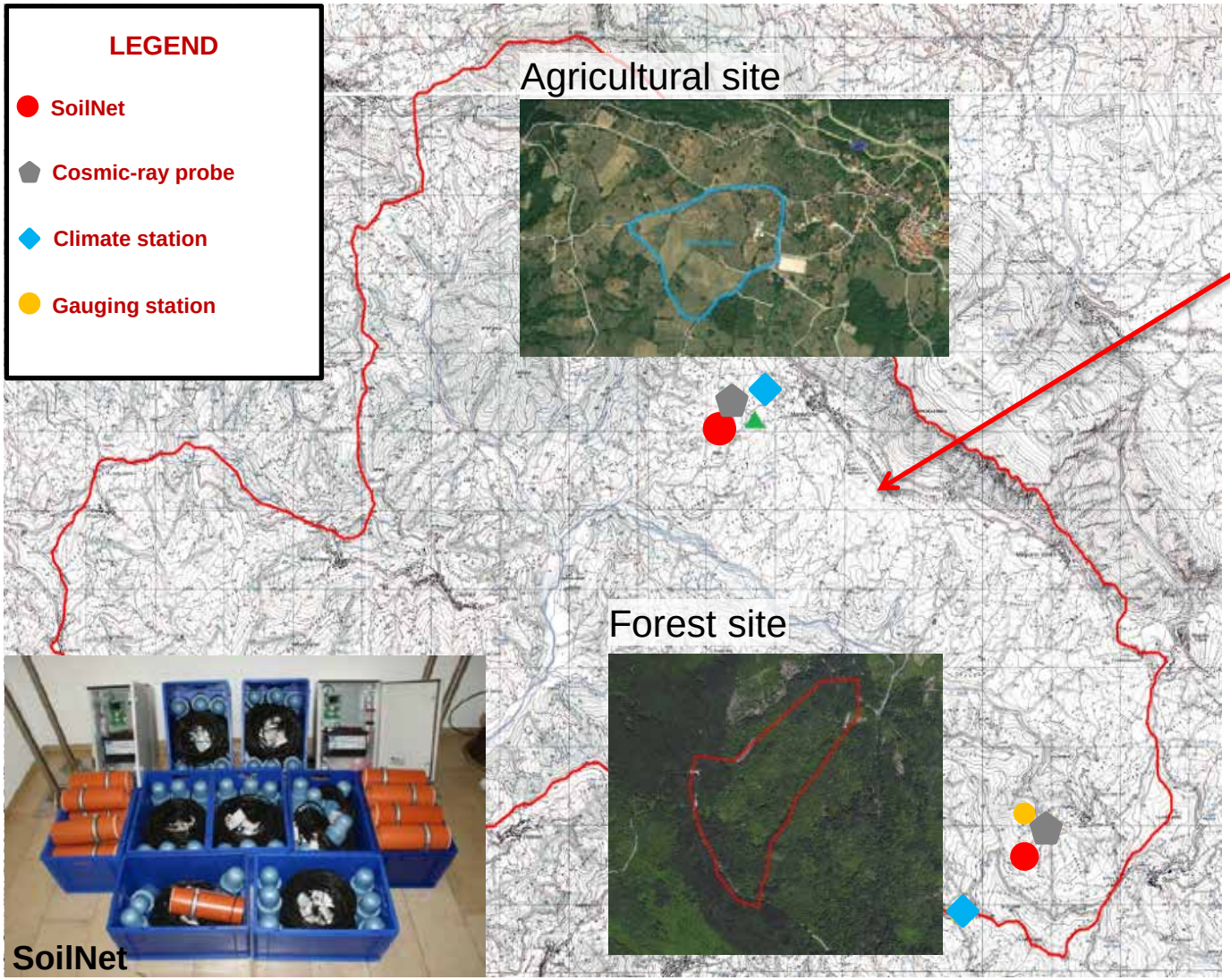
The Alento hydrological observatory



Catchment area: 415 km²

Investigation of hydrological states and fluxes to improve catchment management

Cooperation with Department of Agriculture, University of Naples

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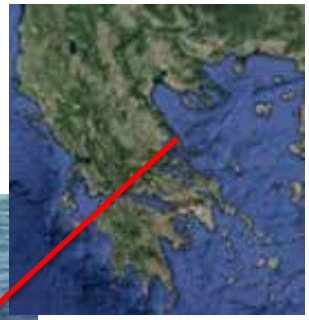
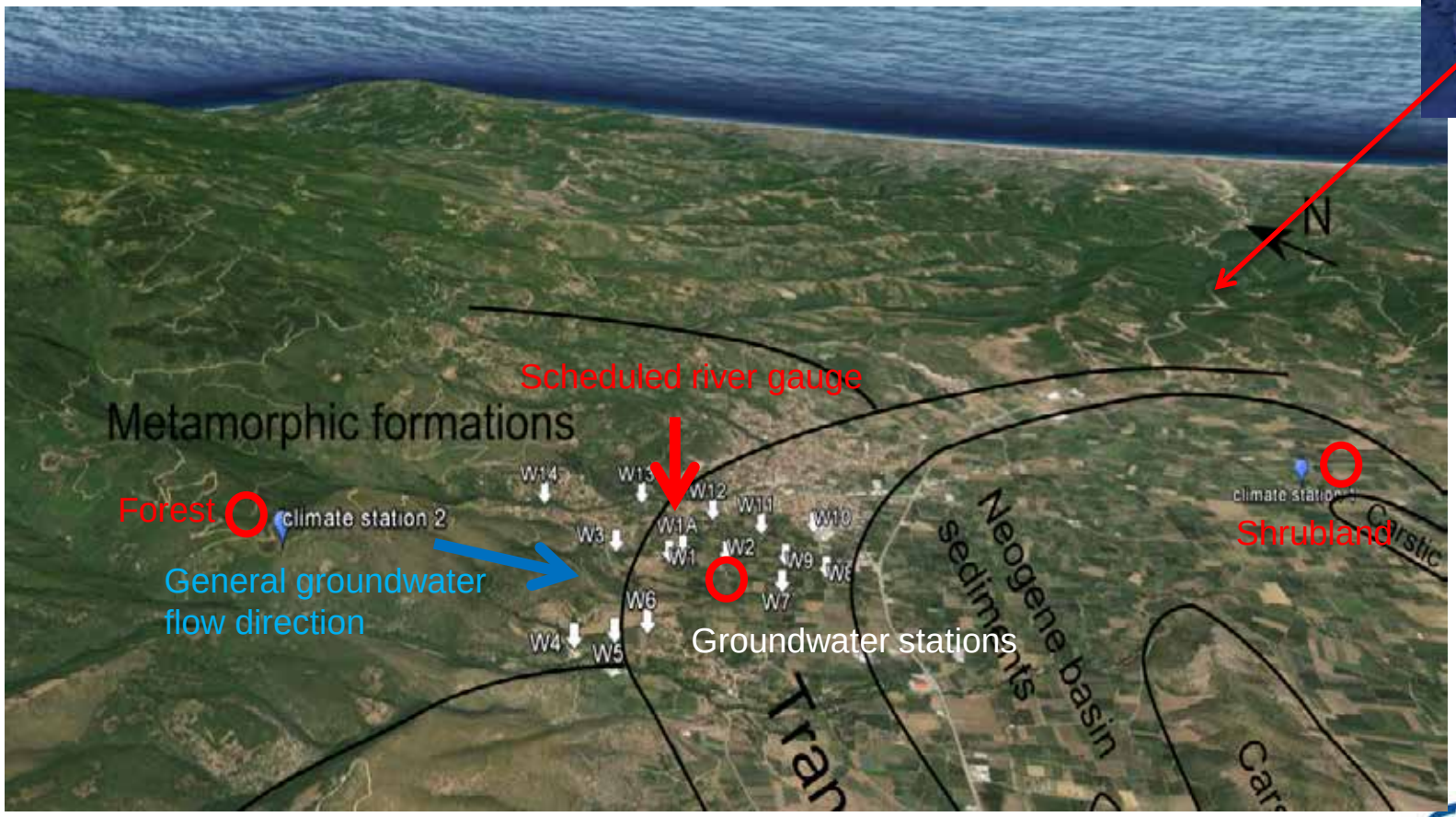
The Thessaly Basin

Cooperation with Hellenic Agricultural Organization, Sondos

One of the highest productive agriculturally areas in Greece

Over-exploitation of groundwater resources since early 1960's (irrigation)





Planned SoilNet sensor network installations

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Helmholtz Alliance: Remote Sensing and Earth System Dynamics

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Remote Sensing and Earth System Dynamics (EDA)

The **key objective of the Helmholtz Alliance** is to prepare the participating institutions for the generation, utilization and integration of bio/geo-physical products provided by the next generation radar remote sensing missions by:

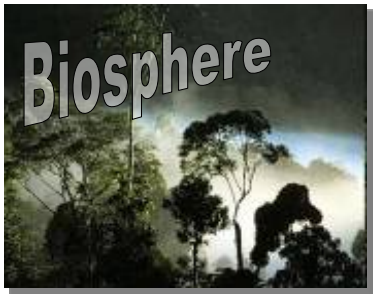
§ **developing/validating bio/geo-physical information products**

§ integrating the **physical products into models**

§ improving the **understanding/modeling of dynamic processes**

§ **establishing a network** between Helmholtz centers/Universities

§ providing a unique **forum for education**



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The Core Team

Helmholtz Center for Environmental Research (**UFZ**), Forschungszentrum Jülich (**FZJ**), German Research Center for Geoscience (**GFZ**), Alfred Wegener Institute for Polar and Marine Research (**AWI**), Karlsruhe Institute of Technology (**KIT**), Helmholtz Center for Ocean Research (**GEOMAR**), German Research Center for Environmental Health (**HGMU**), Potsdam Institute for Climate Impact Research (**PIK**), Federal Institute for Geosciences and Natural Resources (**BGR**), Forest Stewardship Council (**FSC**), Philipps-University Marburg (**PUM**), Technical University Munich (**TUM**), Friedrich Schiller University Jena (**FSU**), Friedrich-Alexander University Erlangen-Nuremberg (**FAU**), University Hamburg (**UHH**), Ludwig Maximillian University Munich (**LMU**), University Potsdam (**UP**), Swiss Federal Institute of Technology Zurich (**ETHZ**)

Principal Investigator

German Aerospace Center **(DLR)**
Microwaves and Radar Institute

Scientific Coordinators

German Aerospace Center (**DLR**)
Helmholtz Center for Environmental Research (**UFZ**)

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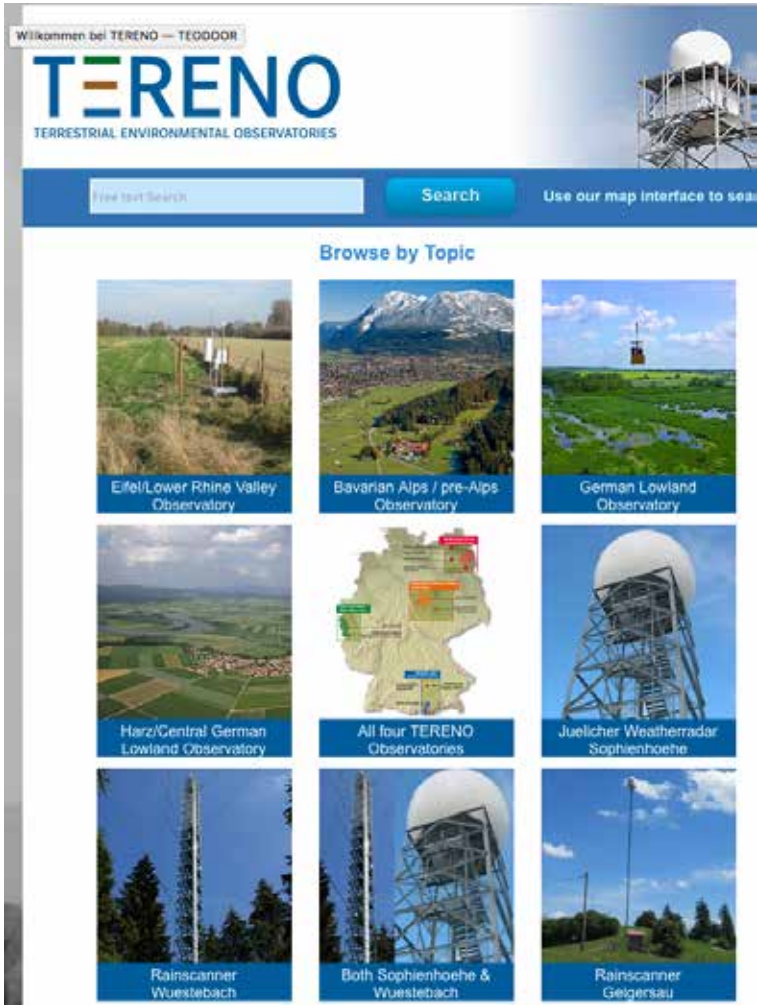
The new Data Discovery Portal

Intro and data query



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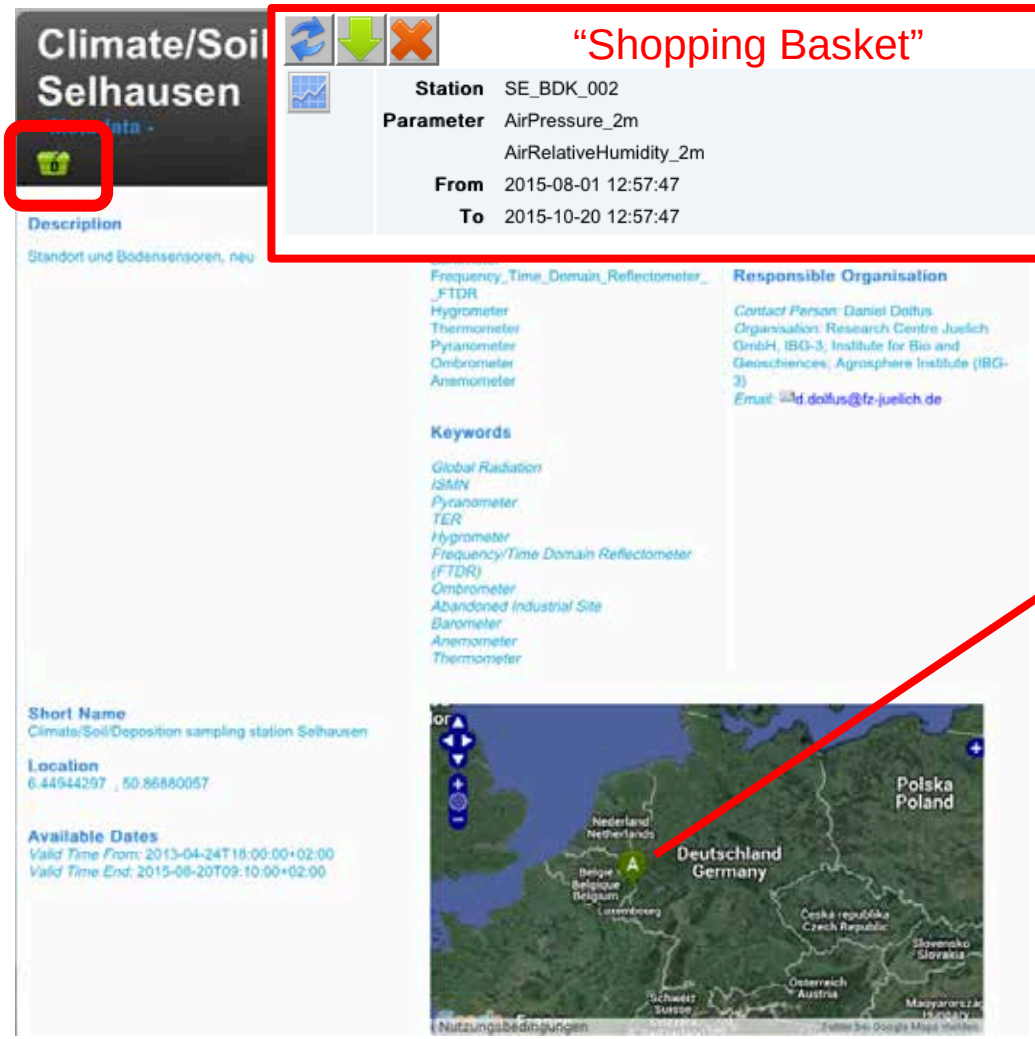
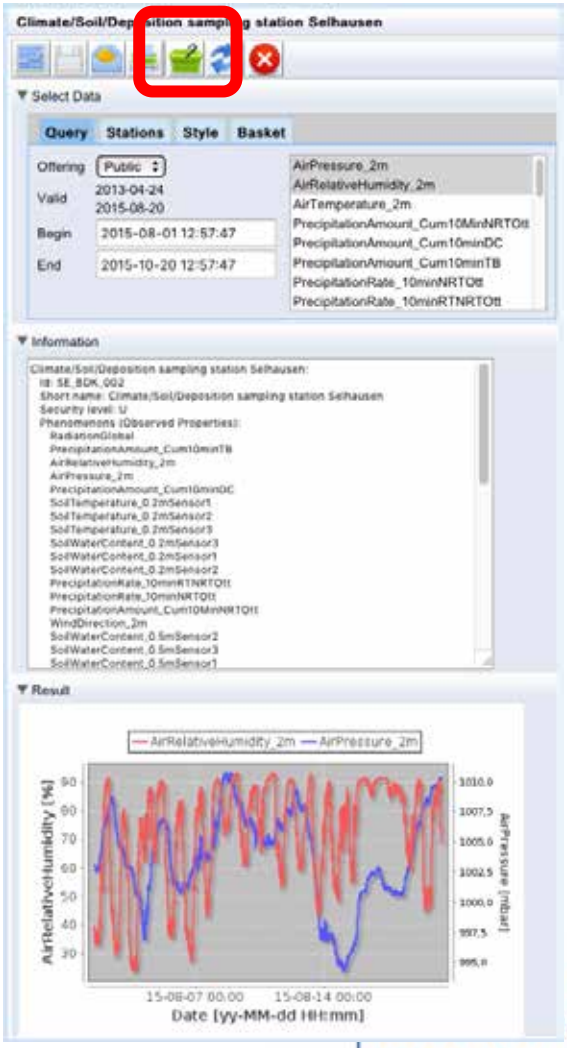
The new Data Discovery Portal

Metadata and Data access





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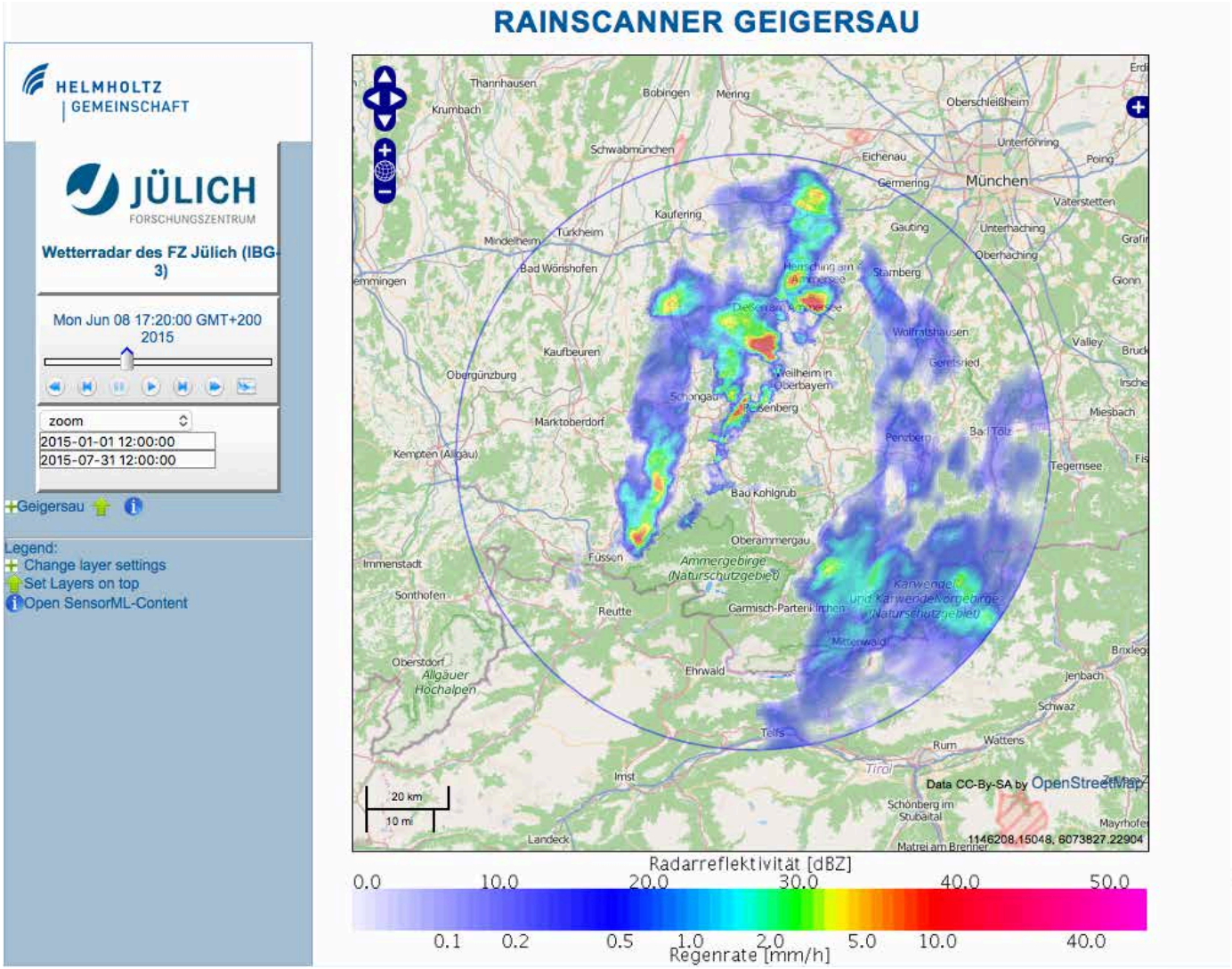
Connecting Geigersau rain scanner (KIT) to TEODOOR



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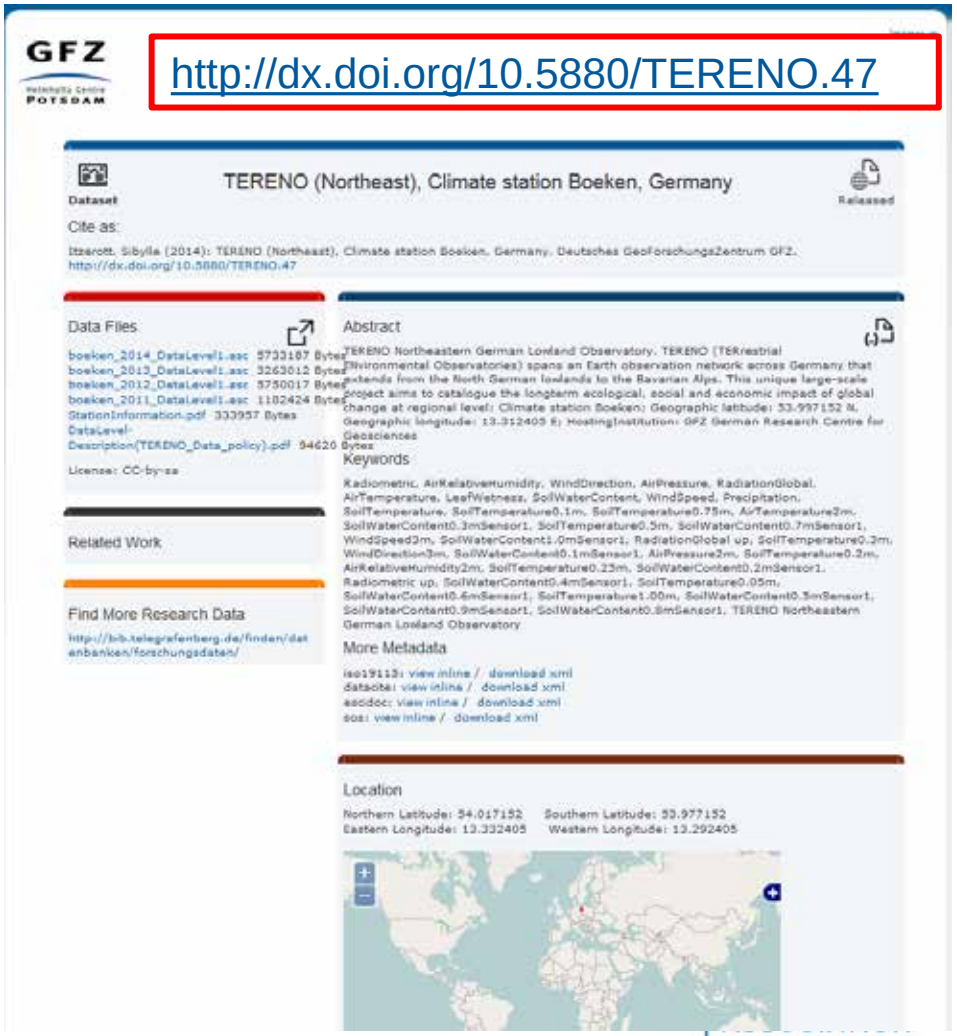
Persistent Data Identifiers

- Unique, digital identifier
- Allows persistent citation of electronic scientific publications and data

- Eases access to research data
- Avoids duplication of work
- Increases visibility of data

- Identifier refers to “landing page” containing:
  - Metadata (for station or data set)
  - Individual data sets
  - Licensing information (e.g. data policy)

- Currently, 20 stations were identified through persistent identifiers by GFZ



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Data acquisition and data provision via TEODOOR

	Eifel/Lower Rhine Valley	Harz/ Central Lowland	North-eastern Lowland	Bavarian Alps and Prealps	
				HMGU	KIT
Climate, soil, water	589 (of 589) stations	1 (of 92) stations data available for 1 station	79 (of 179) stations	11 (of 95) stations data available for 1 station, for 10 stations 1 data value per station	1 (of 8) stations 1 month test data for 1 station
EC flux and meteo	5 (of 5) stations	0 (of 3) stations	2 (of 3) stations	0 (of 1) stations	0 (of 4) stations
Weather radar	2 (of 2) devices	0 (of 1) devices	-	-	1 (of 1) devices
SoilCan	0 (of 36) lysimeters	0 (of 30) lysimeters	0 (of 18) lysimeters	1 (of 6) lysimeters	0 (of 42) lysimeters

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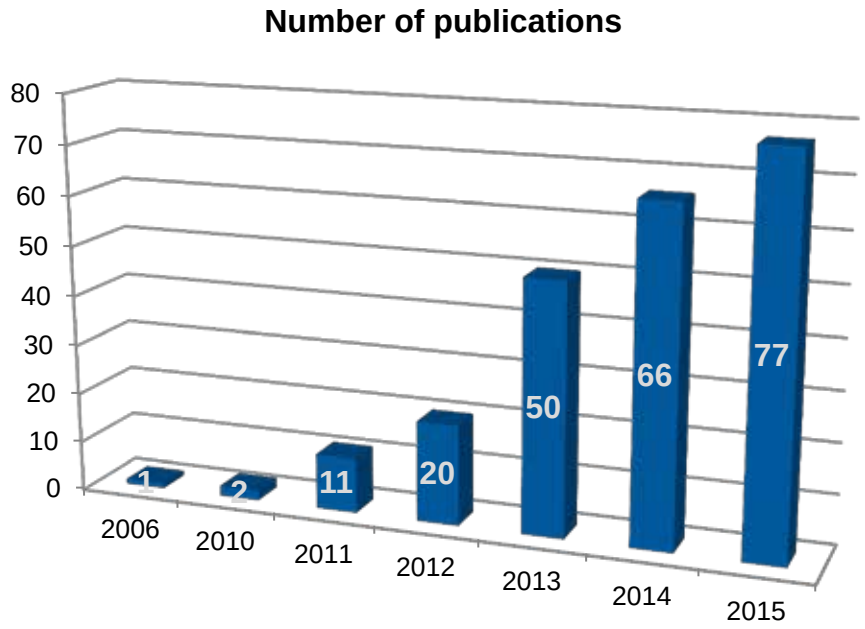
Publications and PhD projects

TERENO-related publications:



PhD projects:

- 7 finished PhD projects before 2014
- 8 finished PhD projects since 2014
- 84 ongoing PhD projects

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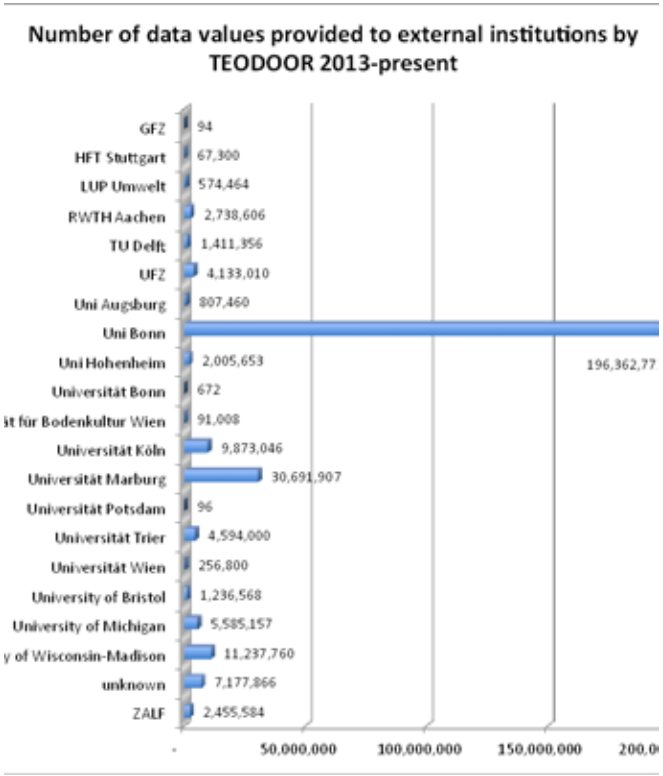
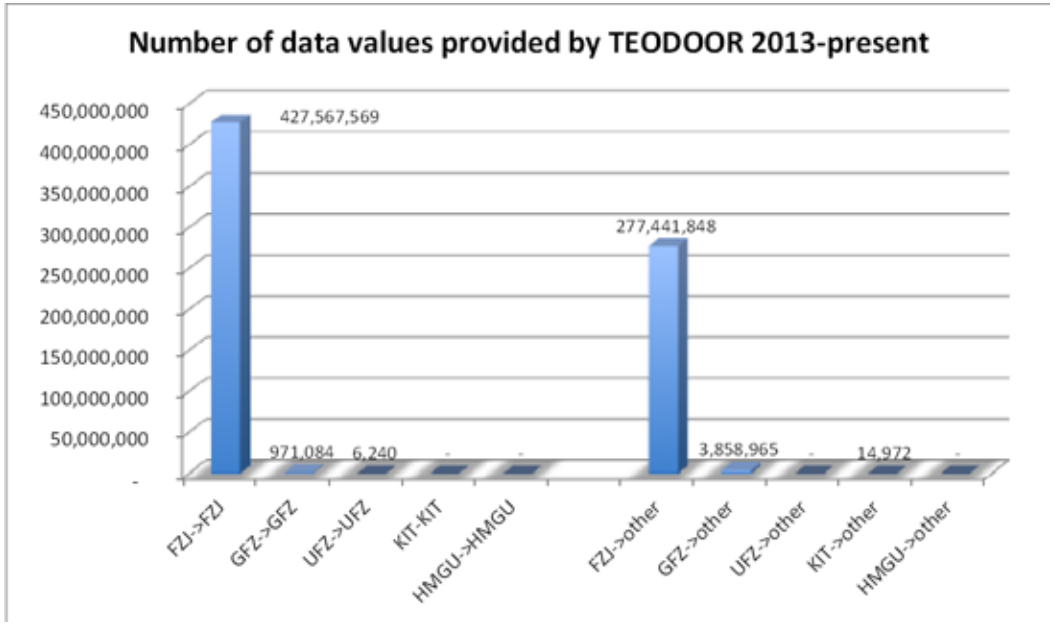
TEODOOR download statistics

(14.8.2013-25.9.2015)





- Ø Number of downloads: 2480
- Ø Number of data series: 134,888
- Ø Number of data values (est): 709,820,280

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