



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

H. Vereecken and the TERENO team



 **International Conference 2014**

 FROM OBSERVATION TO PREDICTION IN TERRESTRIAL SYSTEMS

 29 September to 2 October 2014
Rheinische Friedrich-Wilhelms-Universität Bonn, Germany

TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES




www.tereno-conference2014.de

Next meeting; 2018- ten years TERENO



Bundesministerium
für Bildung
und Forschung

TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES



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.



New TERENO faces



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



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



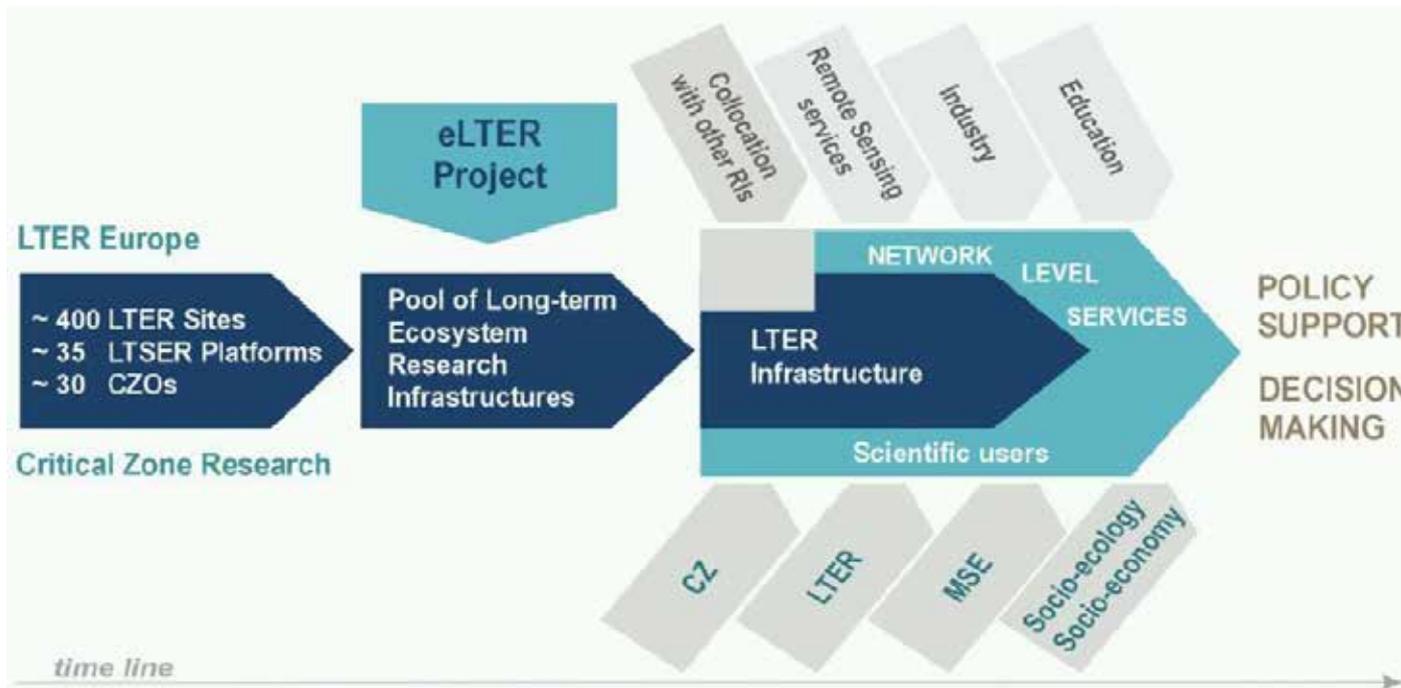
This year Ingo Heinrich and Ralf Kiese became members of the TERENO coordination board



Horizon 2020 project eLTER

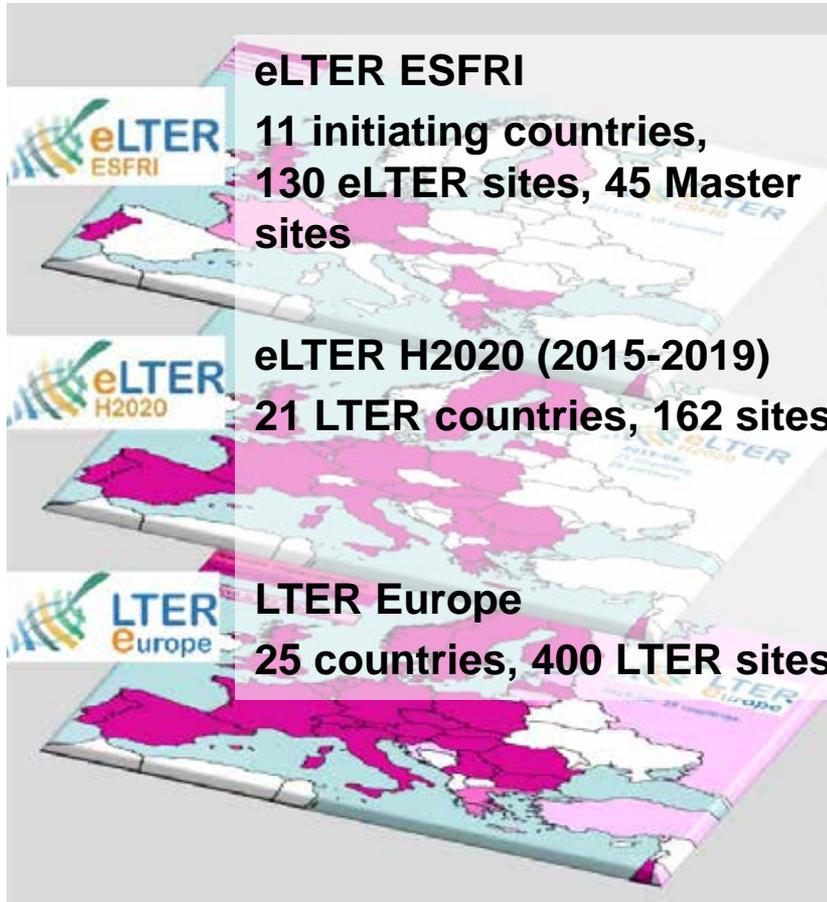
Started this year (runtime: 2015-2019)

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





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

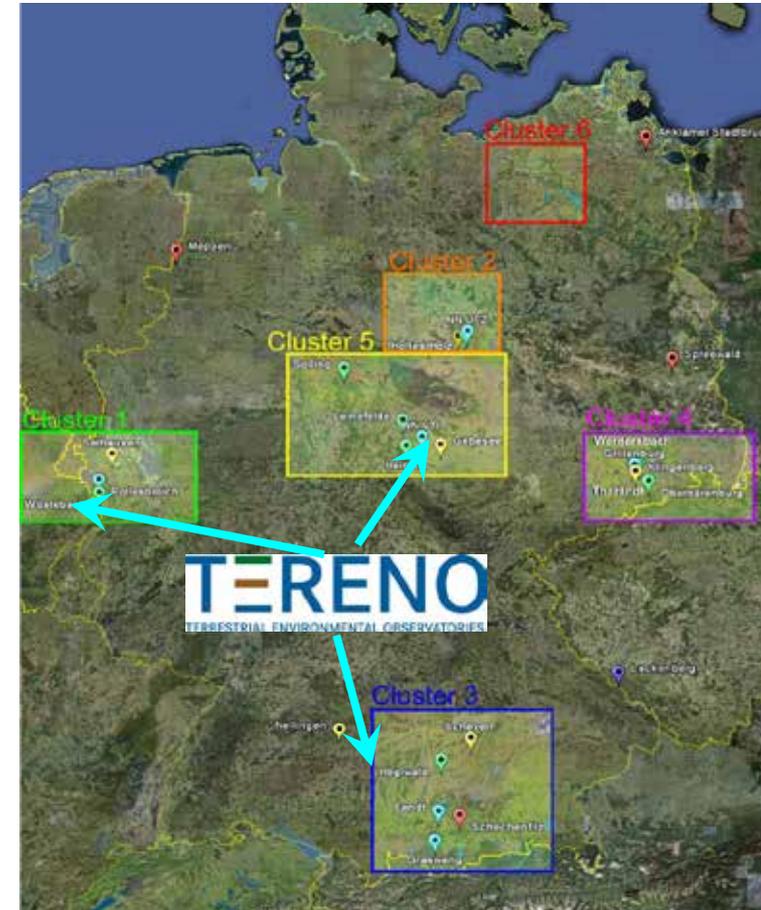


- **Generic research infrastructure** offering basic **services** and baseline activities
- **Harmonized action** of formerly less coordinated elements, enabling new research quality
- **Central steering PLUS adaptive maneuvers** of individual elements
- **Mid- and long-term planning** in close interactions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



ICOS-D

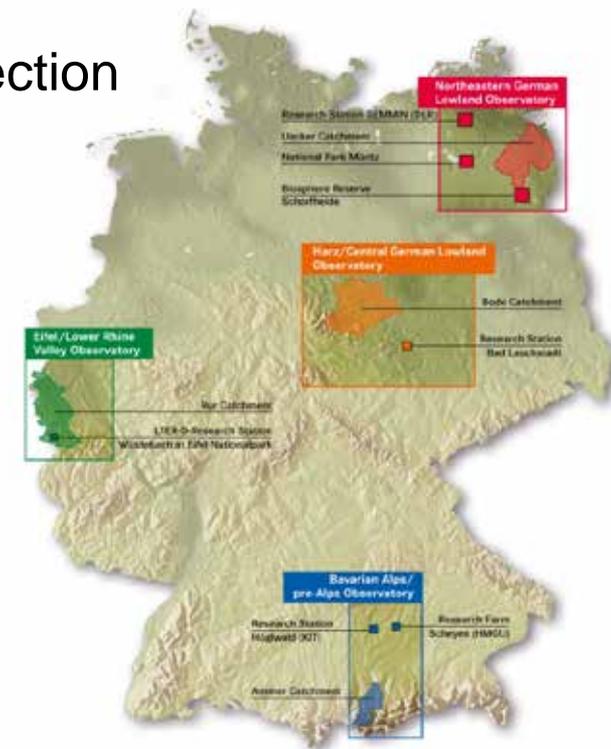
- First implementation phase of ICOS-D completed
- Additional BMBF funding to achieve ICOS 1 class standard:
~1 Mio. € (2016)
- 3 TERENO observatories are included in the ICOS network





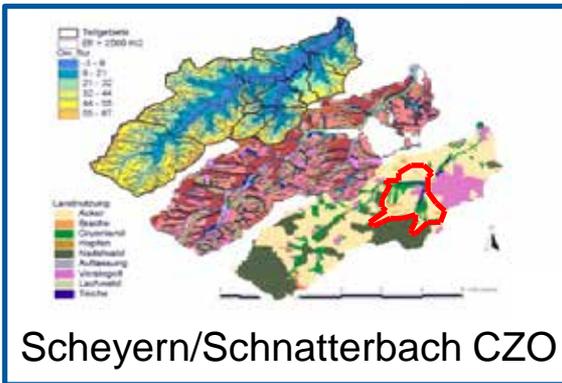
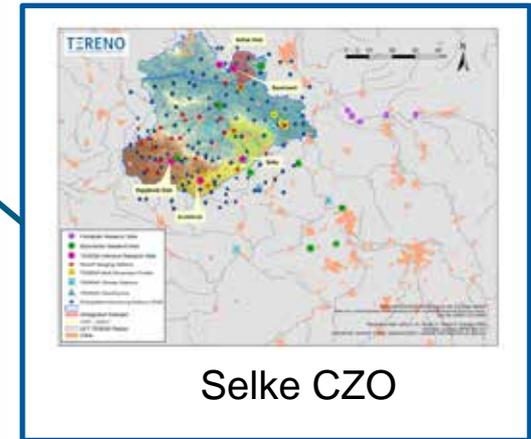
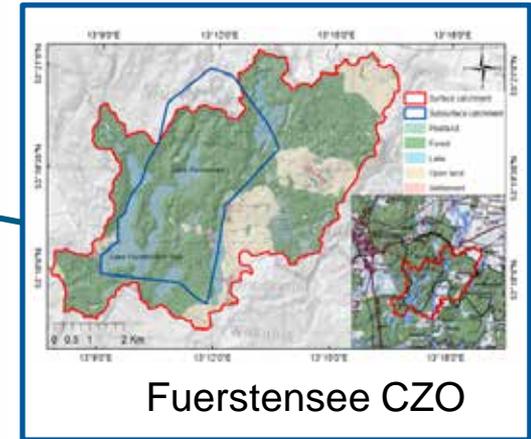
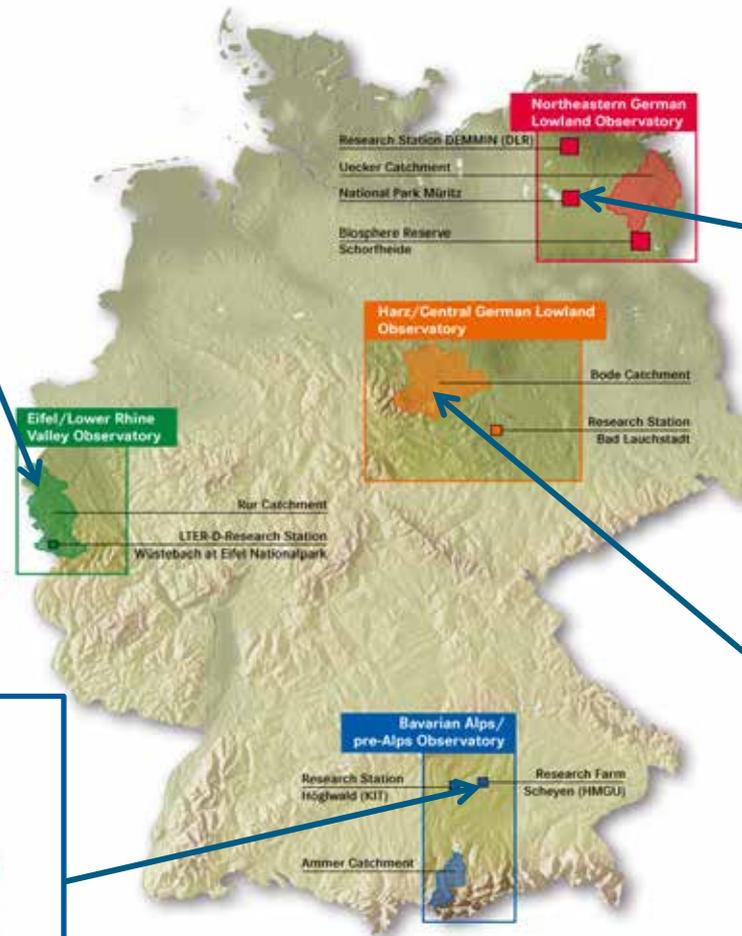
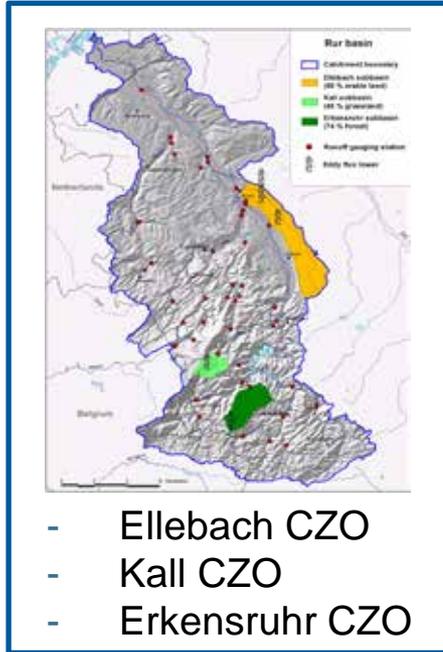
TERENO phd-fellowships

- 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





6 CZOs established within TERENO





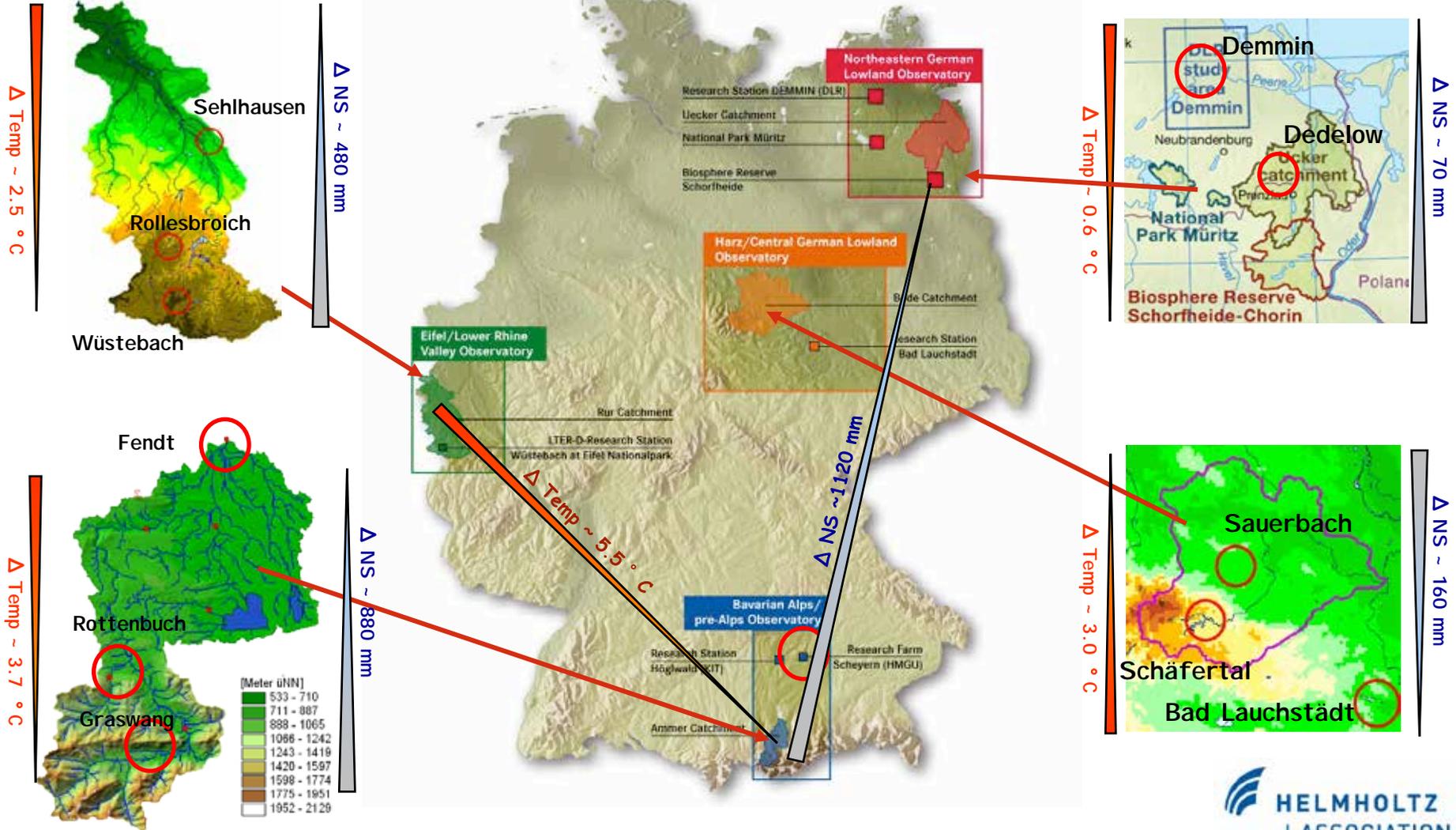
Sino-German CZO Symposium in Nanjing, P.R. China

- 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.





TERENO SoilCan: Tracer experiment





TERENO SoilCan: Tracer experiment

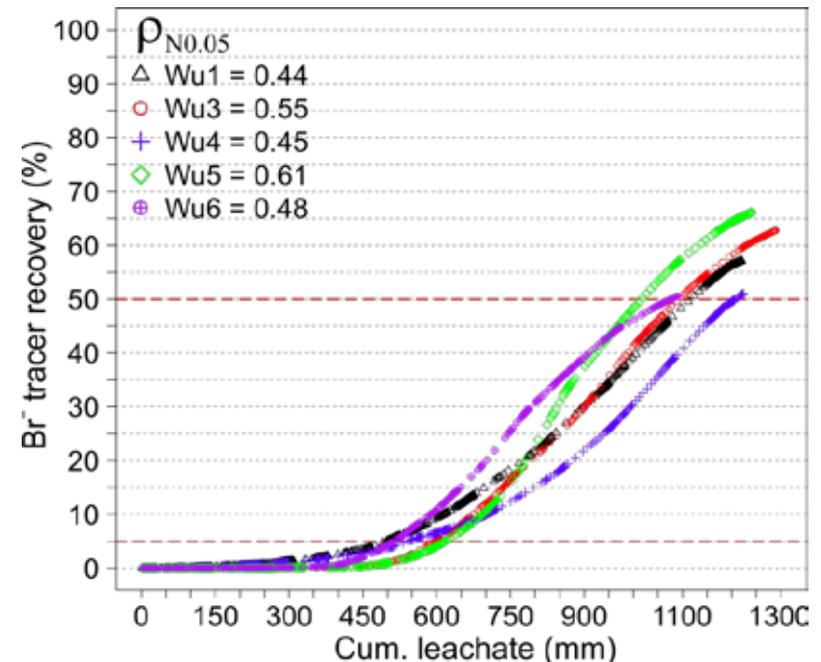
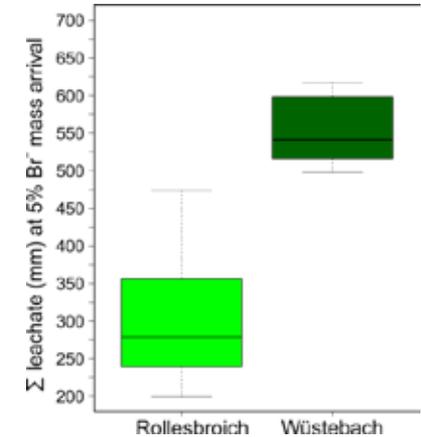
- § Bromide tracer applied Dec. 2013 at 62 lysimeters of HMGU, ZALF, UFZ and FZJ
- § Stable water isotopes measured at 40 lysimeter
- § Soil water sampling at four depths

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)

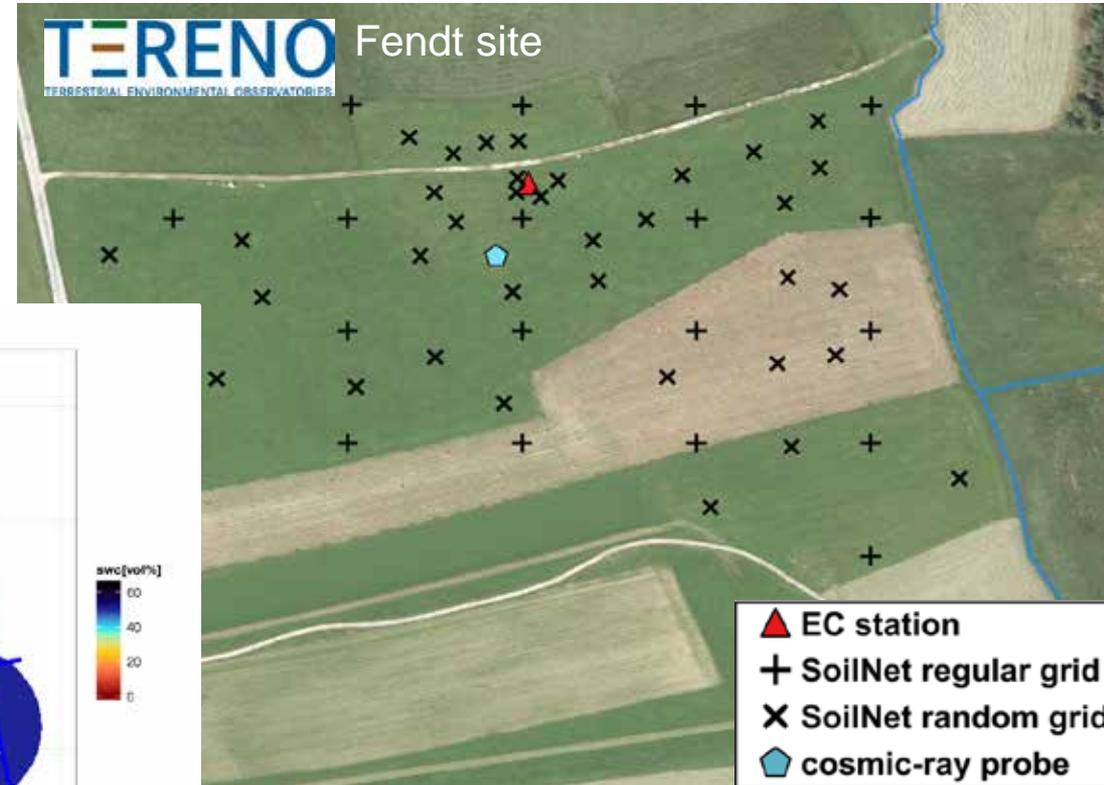
Outlook:

- Investigation of preferential transport under transient hydrological conditions

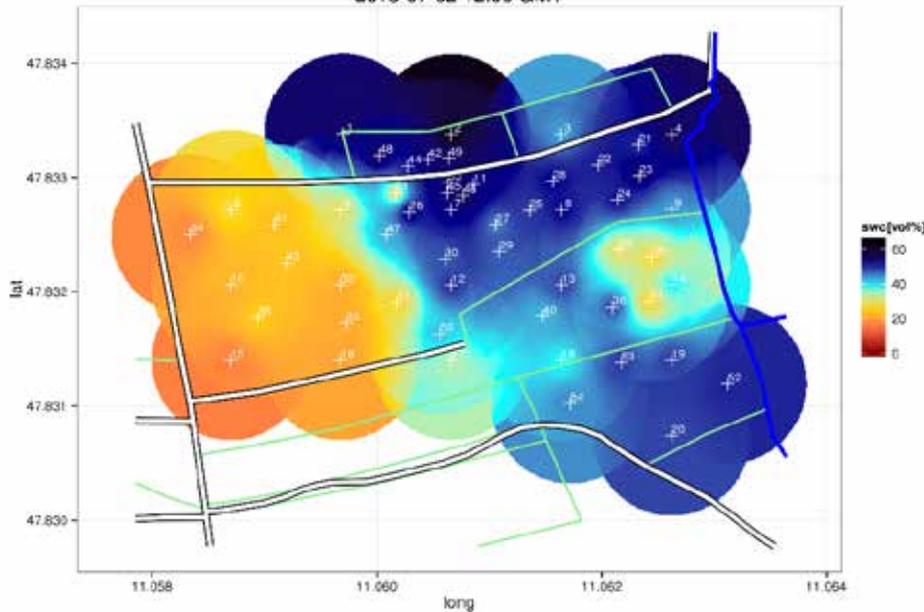




New SoilNet sensor network installation at Prealpine / Alpine Observatory (Fendt site)



2015-07-02 12:00 GMT





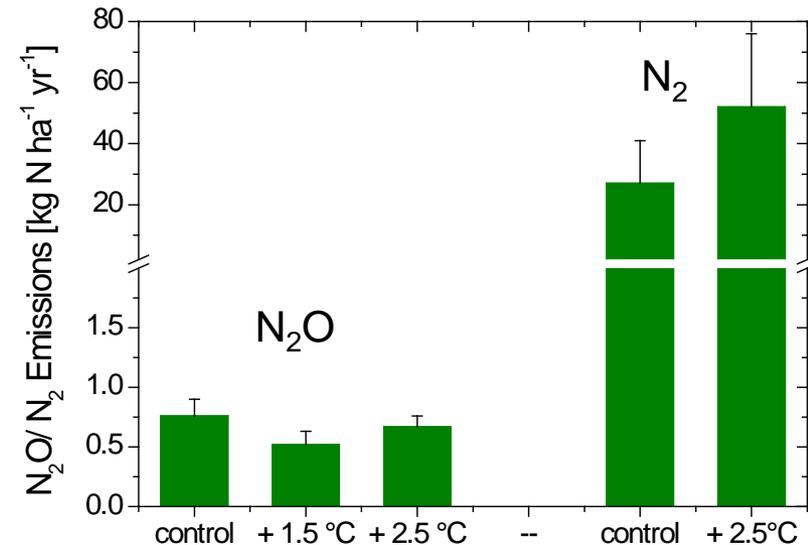
Quantification of N₂O and CH₄ emissions and nutrient budgets at TERENO site Fendt



In montane grasslands climate change

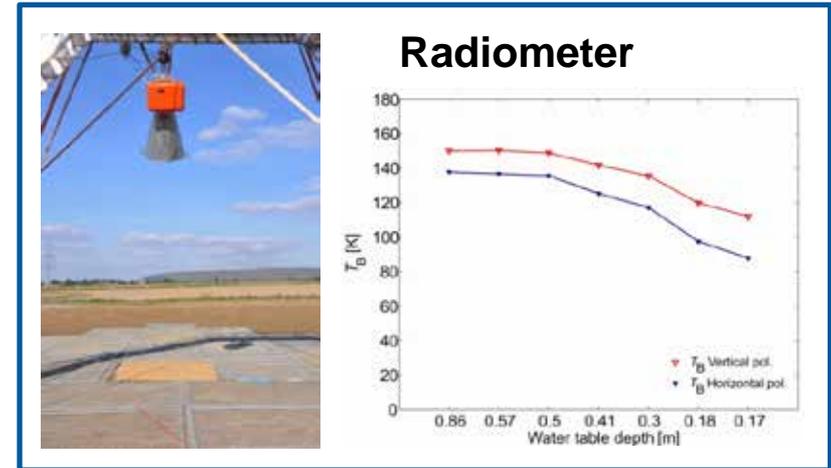
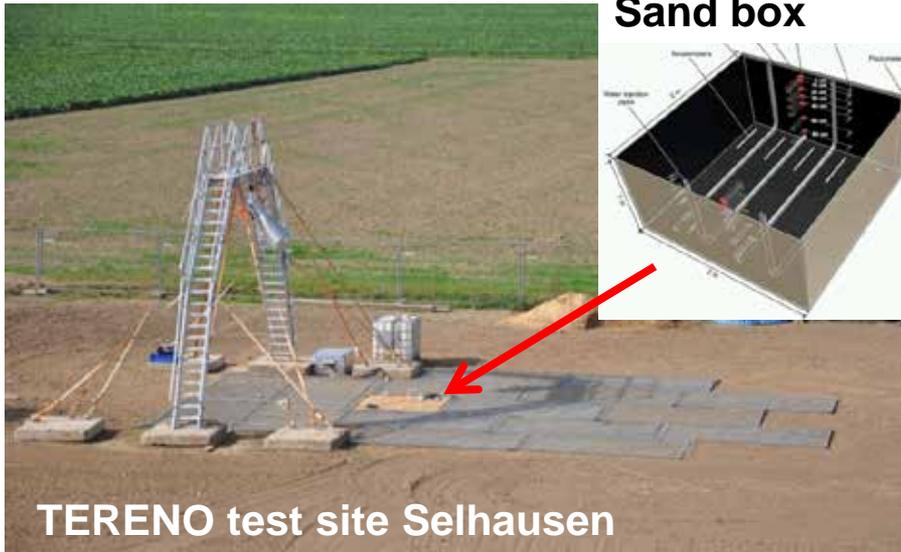
- increase soil CH₄ uptake
- does not effect soil N₂O emissions
- since mainly N₂ emissions increase
- slightly increase N leaching and plant uptake

- à Novel multi-year measurements are essential
- to assess site specific GHG and nutrient budgets,
 - to better understand processes and drivers and
 - for comprehensive model testing and validation

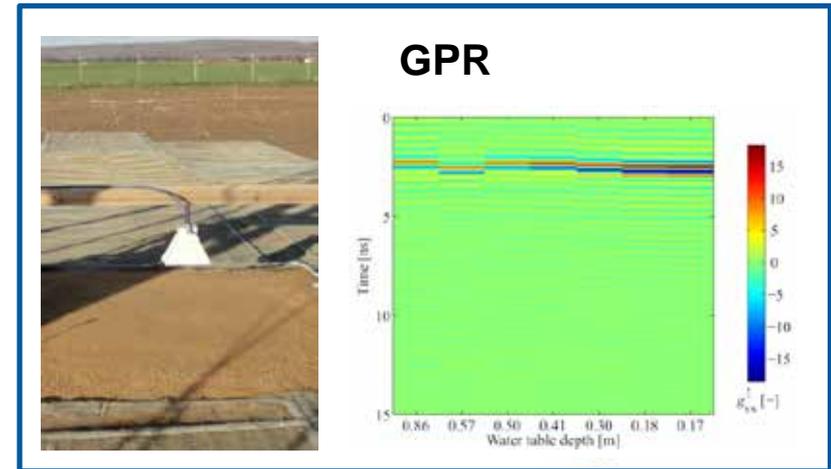
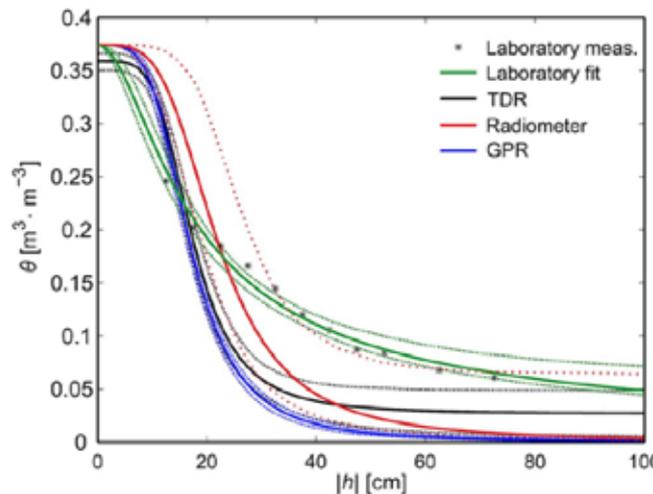




Inverse modeling of soil moisture and soil hydraulic properties from passive and active measurements



Estimation of MvG water retention curves



Jonard et al., 2015,

IEEE Trans. Geosci. Remote Sens. |  **HELMHOLTZ ASSOCIATION**



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)

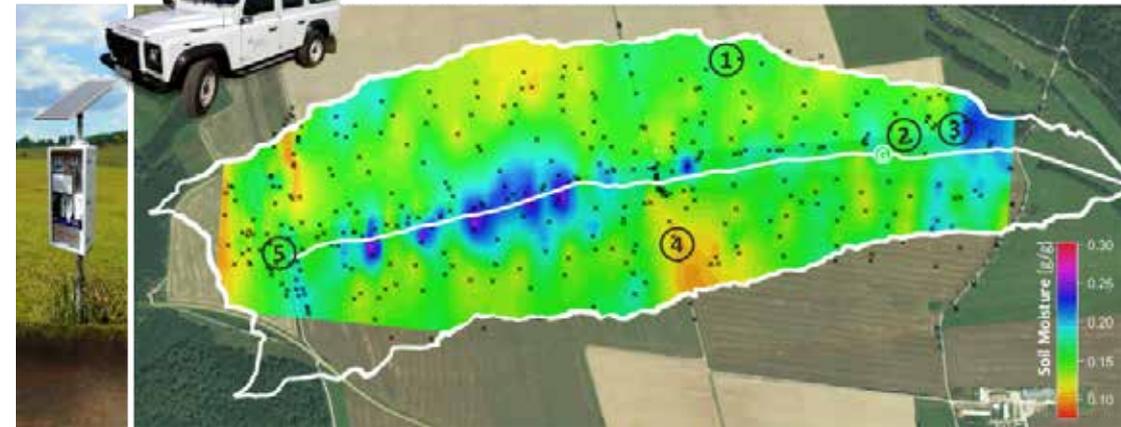


Neutron counts (cph)

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

5 Stationary Cosmic-Ray Neutron Sensors

Regular Surveys with Cosmic-Ray Neutron Rover





Activities in the Mediterranean

Picassent study site
Cooperation with
Polytechnic University
of Valencia

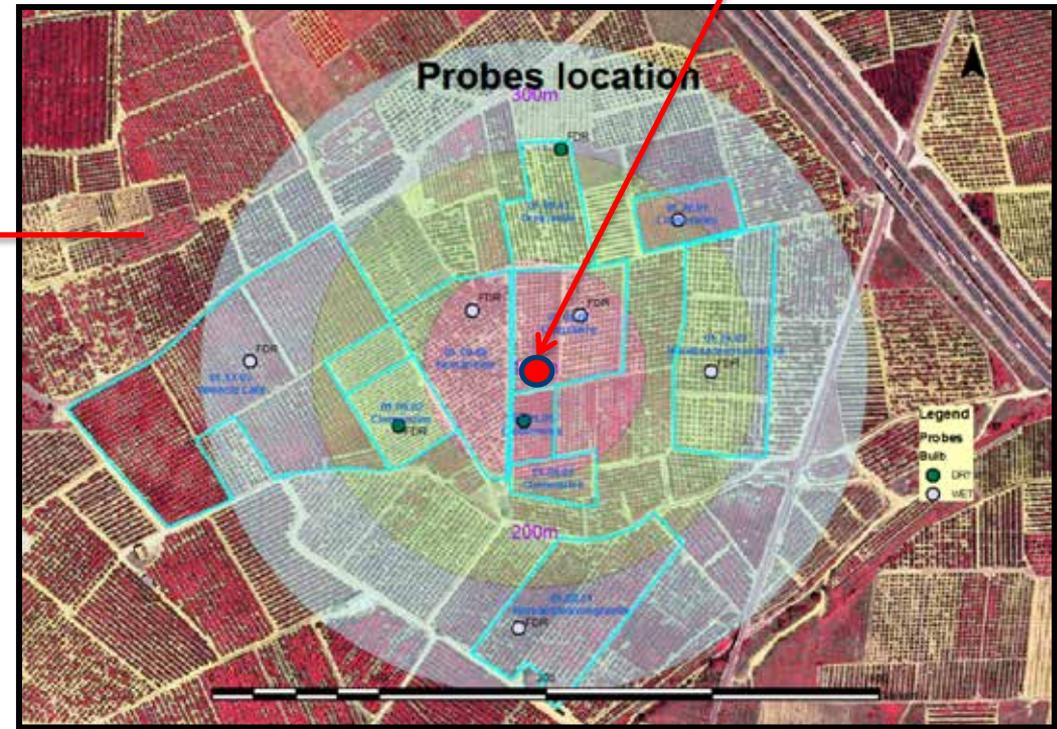
Alento River Basin
Cooperation with
Department of
Agriculture, University
of Naples

Thessaly Basin
Cooperation with Hellenic
Agricultural Organization,
Sondos



Picassent study site, Valencia, Spain

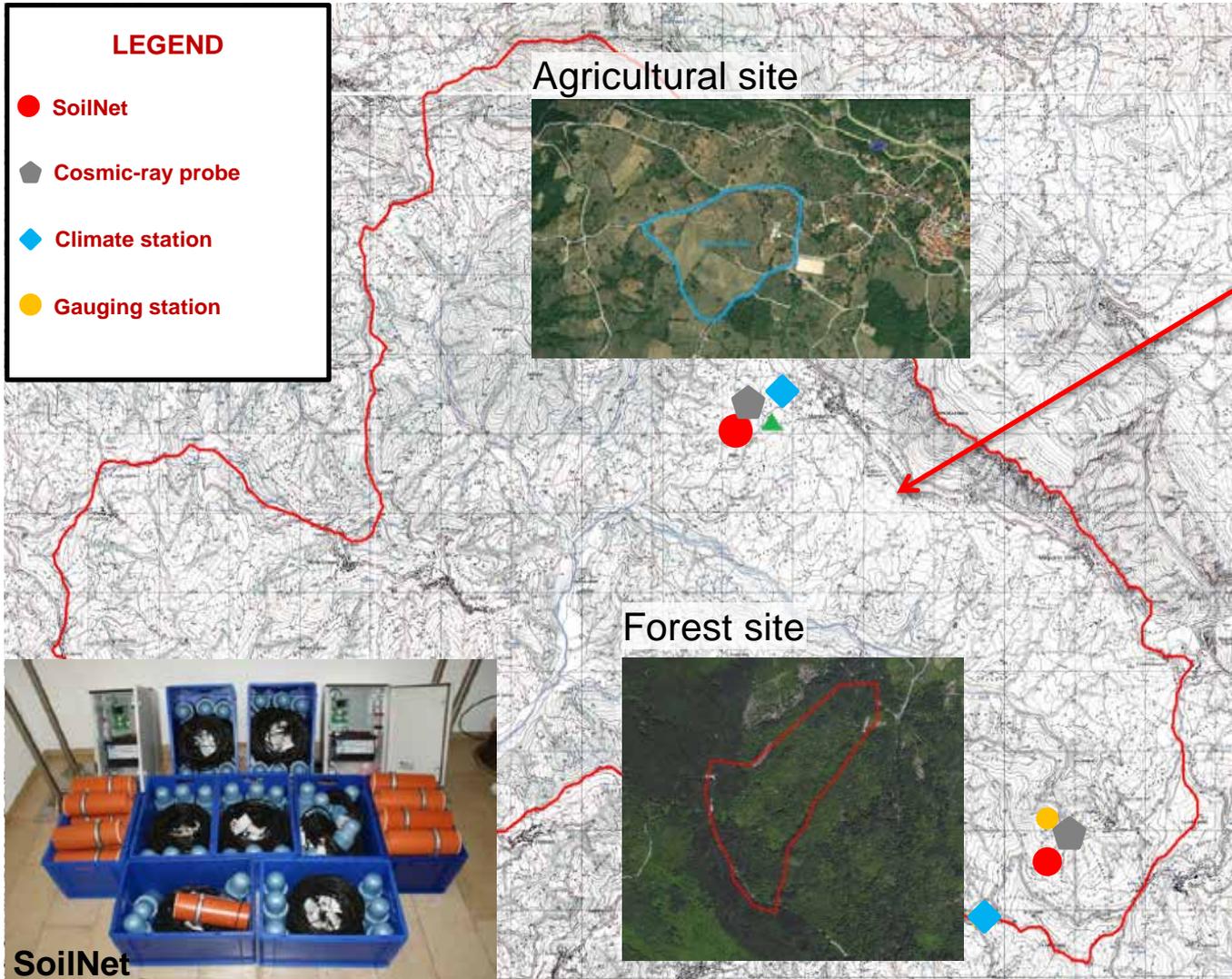
Development of a irrigation management system
for Citrus production using Cosmic-ray Probes



Cooperation with
Polytechnic University of
Valencia



The Alento hydrological observatory



Catchment area: 415 km²

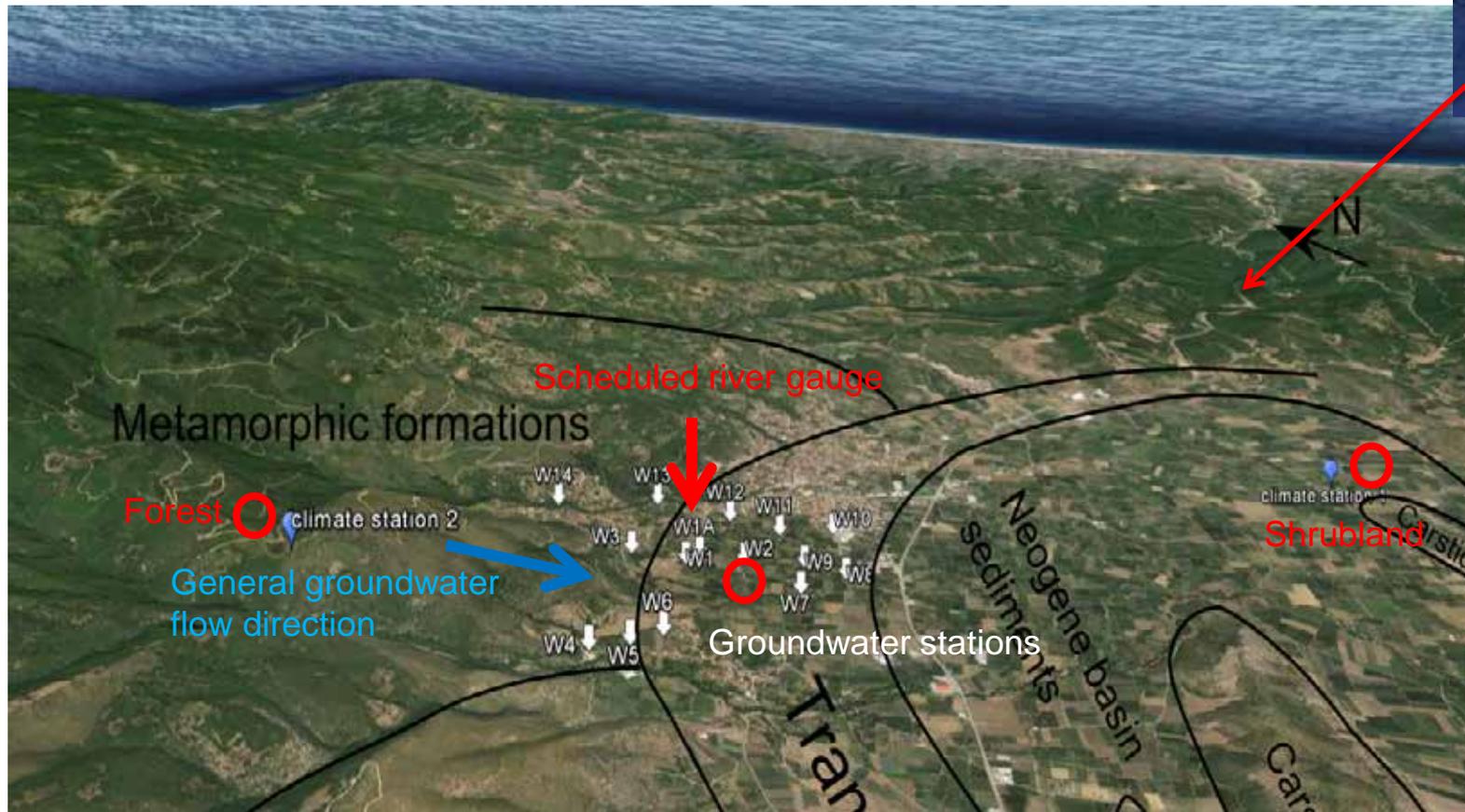
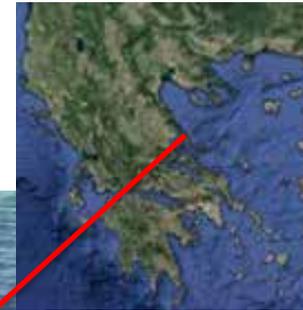
Investigation of hydrological states and fluxes to improve catchment management

Cooperation with Department of Agriculture, University of Naples



The Thessaly Basin

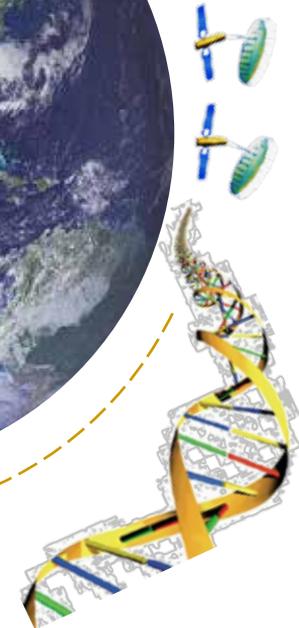
Cooperation with Hellenic Agricultural Organization, Sondos
One of the highest productive agriculturally areas in Greece
Over-exploitation of groundwater resources since early 1960's (irrigation)



 Planned SoilNet sensor network installations



Helmholtz Alliance: Remote Sensing and Earth System Dynamics

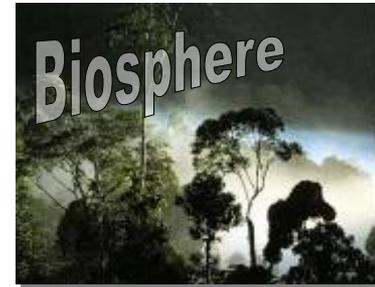




Remote Sensing and Earth System Dynamics (EDA)

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**





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 Maximilian 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**)



The new Data Discovery Portal

Intro and data query

Willkommen bei TERENO — TEDDOOR

TERENO

TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

Free text Search Use our map interface to search

Browse by Topic



Eifel/Lower Rhine Valley Observatory



Bavarian Alps / pre-Alps Observatory



German Lowland Observatory



Harz/Central German Lowland Observatory



All four TERENO Observatories



Juelicher Weatherradar Sophienhoehe



Rainscanner Wuestebach



Both Sophienhoehe & Wuestebach



Rainscanner Geigersau

TERENO DATA PORTAL

TERENO

TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

Search

climate

What? Topic Category Station Type Parameter What? Metadata filter? Abstract Title

Catalogue

IBG-3

From: To:

Map Viewer



Search Results (3)

Type	Title
1	TERENO (Eifel-Rur), Climate/Runoff/Water Quality station Rollesbroich, Germany; 2015
2	TERENO (Eifel-Rur), Climate/Soil/Deposition sampling station Schoenesseifen, Germany; 2015
3	TERENO (Eifel-Rur), EC/Climate station Rollesbroich 3, Germany; 2015

Search Results (54)

Map Ref.	Title
A	Climate/Soil/Deposition sampling station Selhausen; 2015
B	Climate station Einruhr; 2015



The new Data Discovery Portal

Metadata and Data access

**Climate/Soil
Selhausen**
🛒

↻ ↓ ✖
“Shopping Basket”

Station	SE_BDK_002	Remove
Parameter	AirPressure_2m AirRelativeHumidity_2m	Download
From	2015-08-01 12:57:47	
To	2015-10-20 12:57:47	

Description
Standort und Bodensensoren, neu

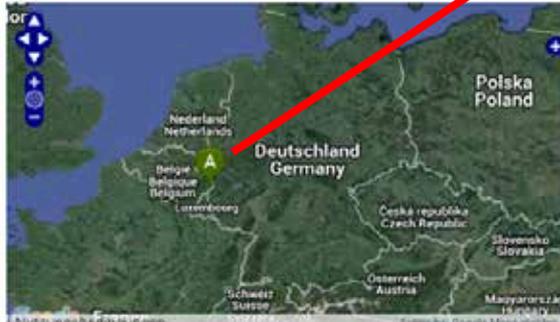
Keywords
 Global Radiation
 ISMN
 Pyranometer
 TER
 Hygrometer
 Frequency/Time Domain Reflectometer (FTDR)
 Ombrometer
 Abandoned Industrial Site
 Barometer
 Anemometer
 Thermometer

Short Name
Climate/Soil/Deposition sampling station Selhausen

Location
6.44944297 ; 50.86880057

Available Dates
 Valid Time From: 2013-04-24T18:00:00+02:00
 Valid Time End: 2015-08-20T09:10:00+02:00

Responsible Organisation
 Contact Person: Daniel Dofus
 Organisation: Research Centre Juelich GmbH, IBG-3, Institute for Bio and Geosciences, Agrosphere Institute (IBG-3)
 Email: d.dofus@fz-juelich.de



Climate/Soil/Deposition sampling station Selhausen

↻ ↓ ✖ 🛒

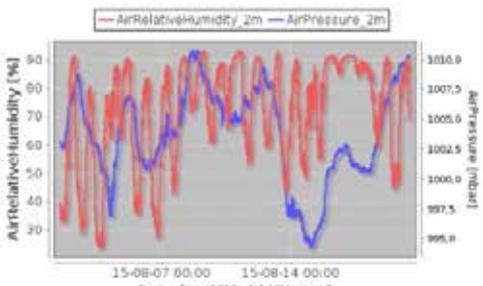
Select Data

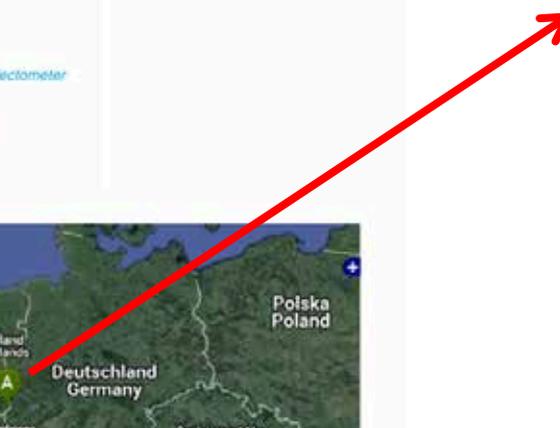
Query	Stations	Style	Basket
Offering: Public			AirPressure_2m AirRelativeHumidity_2m AirTemperature_2m
Valid: 2013-04-24 2015-08-20			PrecipitationAmount_Cum10minNRTOT PrecipitationAmount_Cum10minDC PrecipitationRate_10minNRTOT
Begin: 2015-08-01 12:57:47			PrecipitationRate_10minNRTOT
End: 2015-10-20 12:57:47			

Information

Climate/Soil/Deposition sampling station Selhausen:
 ID: SE_BDK_002
 Short name: Climate/Soil/Deposition sampling station Selhausen
 Security level: U
 Phenomena ID Observed Properties:
 RadiationGlobal
 PrecipitationAmount_Cum10minTB
 AirRelativeHumidity_2m
 AirPressure_2m
 PrecipitationAmount_Cum10minDC
 SoilTemperature_0_2mSensor1
 SoilTemperature_0_2mSensor2
 SoilTemperature_0_2mSensor3
 SoilWaterContent_0_2mSensor1
 SoilWaterContent_0_2mSensor2
 SoilWaterContent_0_2mSensor3
 PrecipitationRate_10minNRTOT1
 PrecipitationRate_10minNRTOT2
 PrecipitationAmount_Cum10minNRTOT1
 WindDirection_2m
 SoilWaterContent_0_5mSensor2
 SoilWaterContent_0_5mSensor3
 SoilWaterContent_0_5mSensor1

Result







Connecting Geigersau rain scanner (KIT) to TEODOOR


**HELMHOLTZ
 GEMEINSCHAFT**


JÜLICH
 FORSCHUNGSZENTRUM

Wetterradar des FZ Jülich (IBG-3)

Mon Jun 08 17:20:00 GMT+200
 2015

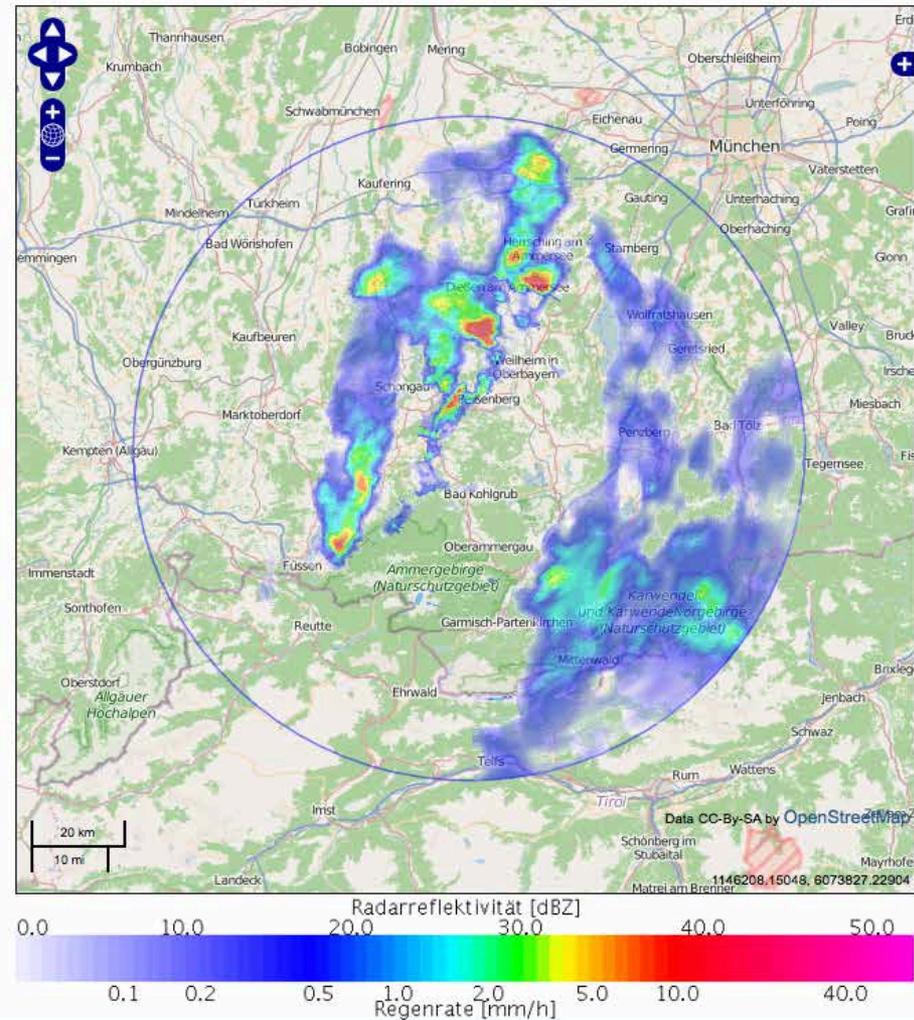
[Navigation icons: back, forward, stop, play, refresh, zoom in, zoom out]

zoom [dropdown arrow]
 2015-01-01 12:00:00
 2015-07-31 12:00:00

+ Geigersau [location pin icon] [info icon]

Legend:
 + Change layer settings
 [location pin icon] Set Layers on top
 [info icon] Open SensorML-Content

RAINSCANNER GEIGERSAU





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**



GFZ
Geophysikalisches
Zentrum
POTSDAM

<http://dx.doi.org/10.5880/TERENO.47>

TERENO (Northeast), Climate station Boeken, Germany

Released

Dataset

Cite as:
Itzerott, Sibylla (2014): TERENO (Northeast), Climate station Boeken, Germany, Deutsches GeoForschungsZentrum GFZ.
<http://dx.doi.org/10.5880/TERENO.47>

Data Files

- boeken_2014_DataLevel1.asc 5733187 Bytes
- boeken_2013_DataLevel1.asc 3263012 Bytes
- boeken_2012_DataLevel1.asc 3730017 Bytes
- boeken_2011_DataLevel1.asc 1102424 Bytes
- StationInformation.pdf 333937 Bytes
- DataLevel-Description(TERENO_Data_policy).pdf 34620 Bytes

License: CC-BY-SA

Abstract

TERENO Northeastern German Lowland Observatory. TERENO (TERrestrial Environmental Observatories) spans an Earth observation network across Germany that extends from the North German lowlands to the Bavarian Alps. This unique large-scale project aims to catalogue the longterm ecological, social and economic impact of global change at regional level. Climate station Boeken: Geographic latitude: 53.997152 N, Geographic longitude: 13.312405 E; HostingInstitution: GFZ German Research Centre for Geosciences

Keywords:
Radiometric, AirRelativeHumidity, WindDirection, AirPressure, RadiationGlobal, AirTemperature, LeafWetness, SoilWaterContent, WindSpeed, Precipitation, SoilTemperature, SoilTemperature0.1m, SoilTemperature0.75m, AirTemperature2m, SoilWaterContent0.3mSensor1, SoilTemperature0.5m, SoilWaterContent0.7mSensor1, WindSpeed0m, SoilWaterContent0.0mSensor1, RadiationGlobal up, SoilTemperature0.2m, WindDirection0m, SoilWaterContent0.1mSensor1, AirPressure2m, SoilTemperature0.2m, AirRelativeHumidity2m, SoilTemperature0.23m, SoilWaterContent0.2mSensor1, Radiometric up, SoilWaterContent0.4mSensor1, SoilTemperature0.05m, SoilWaterContent0.6mSensor1, SoilTemperature1.00m, SoilWaterContent0.5mSensor1, SoilWaterContent0.9mSensor1, SoilWaterContent0.8mSensor1, TERENO Northeastern German Lowland Observatory

More Metadata

- iso19113: [view inline](#) / [download xml](#)
- datacube: [view inline](#) / [download xml](#)
- accddc: [view inline](#) / [download xml](#)
- soi: [view inline](#) / [download xml](#)

Location

Northern Latitude: 54.017152 Southern Latitude: 53.977152
Eastern Longitude: 13.332405 Western Longitude: 13.292405





Data acquisition and data provision via TEODOOR

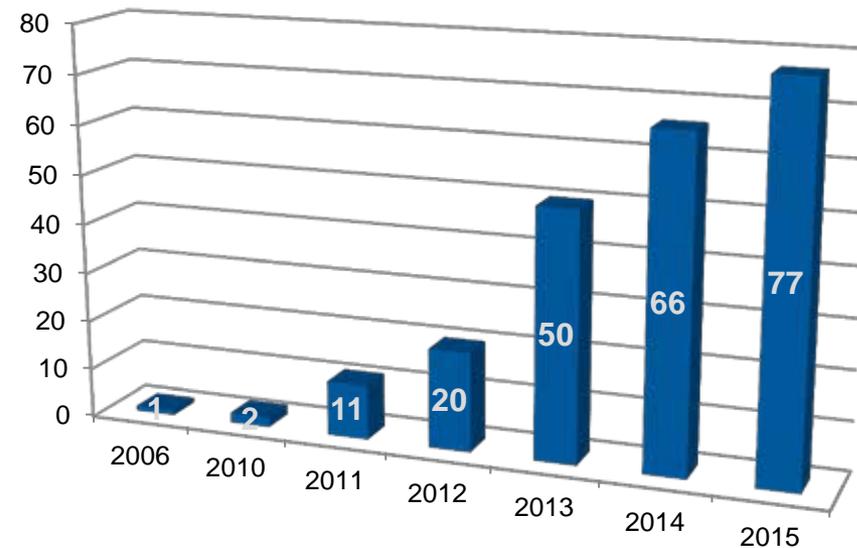
	Eifel/Lower Rhine Valley	Harz/Central Lowland	North-eastern Lowland	Bavarian Alps and Prealps HMGU	KIT
Climate, soil, water	589 (of 589) stations	1 (of 92) stations data available for 1 station	79 (of 179) stations	11 (of 95) stations data available for 1 station, for 10 stations 1 data value per station	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



Publications and PhD projects

TERENO-related publications:

Number of publications



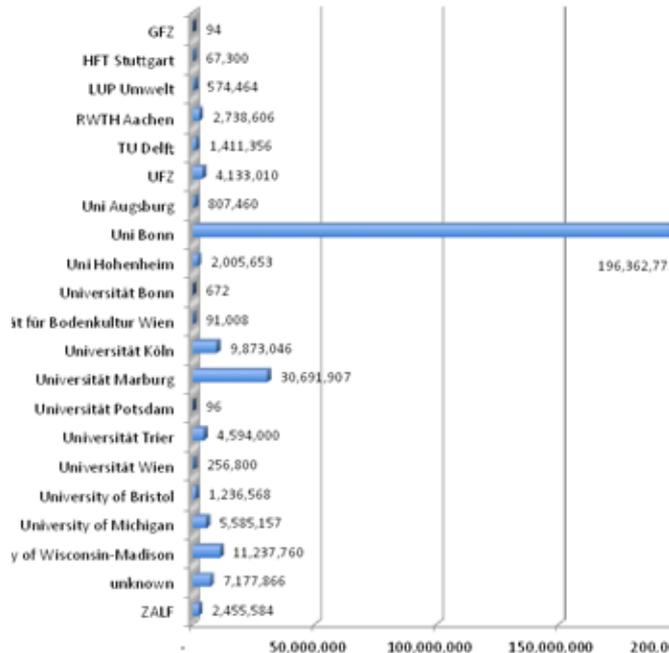
PhD projects:

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

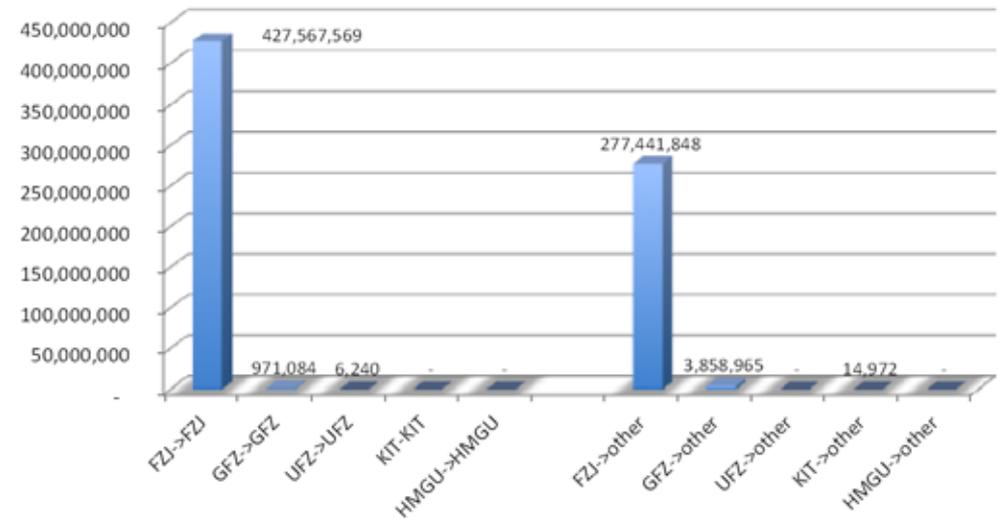


TEODOOR download statistics (14.8.2013-25.9.2015)

Number of data values provided to external institutions by TEODOOR 2013-present



Number of data values provided by TEODOOR 2013-present



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