

Data management within TERENO

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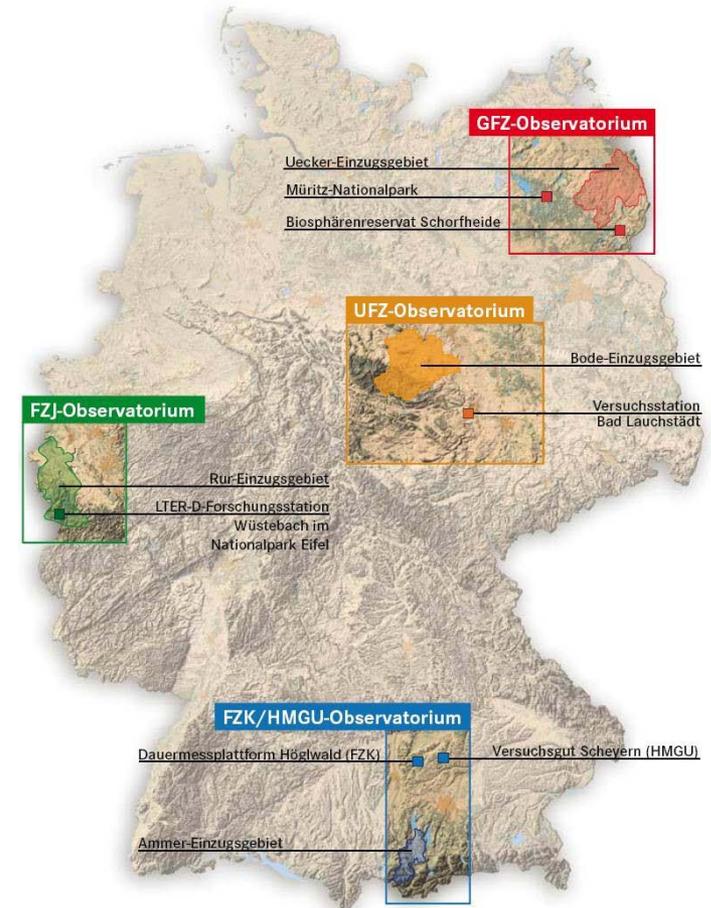
TERENO Advisory Board Meeting

October 18/19.10.2009



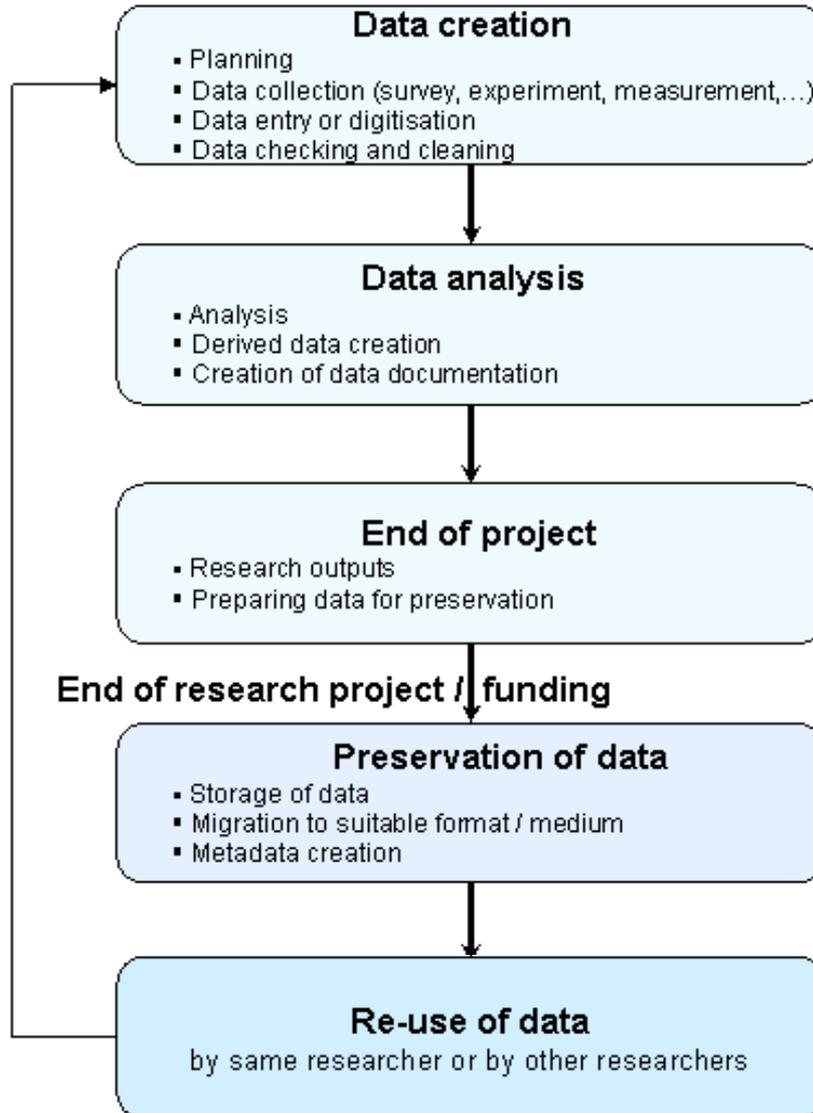
Environmental observations data

- Different institutions
- Documentations, pictures, reports etc.
- Heterogeneous data in various resolutions
 - Point data (sensors)
 - Raster data (radar data, remote sensing)
 - Vector data (river networks, boundaries)
 - Time series
- Different research groups and needs
 - Different topics and questions
 - Input and output for different models





General data management tasks



TERENO data management tasks:

- Data definition and data modelling
- Design and operation of data base systems
- Data processing and data presentation adjusted to the needs
- Data security and protection
- Data acquisition from external sources
- Data policy



Procedure to set up and operate a data management infrastructure for TERENO

- Creation of a data management plan:
 - Identification of user requirements
 - Identification possible solutions
 - Agreements concerning data and metadata standards (e.g. ISO19119)
 - Nomination of responsible persons
- Infrastructure implementation
 - Selection of hardware and software components
 - System setup
 - Implementation of interfaces (internal/external)
 - Import of existing and/or external data
- System operation and maintenance
 - Consulting and support
 - Continuous adjustments to the needs



Data management plan: Specification of needs **by the users**

- Which data are produced?
- Which existing data are required?
- Preferred data formats and metadata standards
- Data quality and data security arrangements to be implemented
- Specification of responsibilities for data management within each observatory
- Specification of data originator and data owner
- Data access to other users -> Data policy

Online query has been performed
Results of survey are currently evaluated!

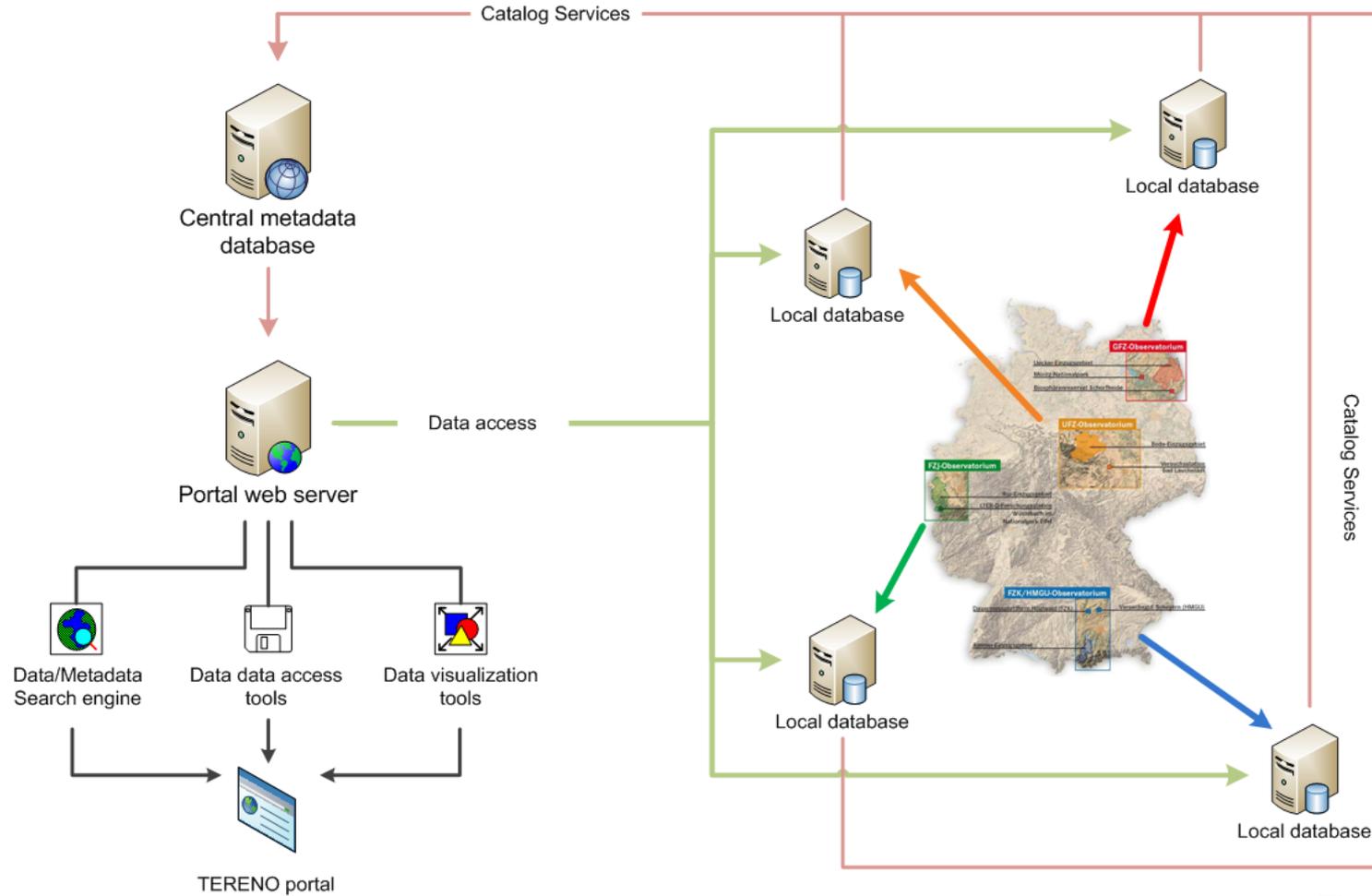


General considerations on the TERENO data infrastructure

- Central TERENO portal to query, visualize and access data
- Central metadata database
- Decentralized data infrastructure in each observatory
- Standardized data models
- Communication between TERENO portal and local databases via standardized (OGC-conformal) Web-services operated in each observatory
 - CSW: Web Catalogue Service to distribute Metadata
 - WFS: Web Feature Service to distribute point, vector and time series data
 - WCS: Web Coverage Service to distribute raster data
 - WMS: Web Map Service to visualize data as maps
 - Direct access to time series data from remote data bases



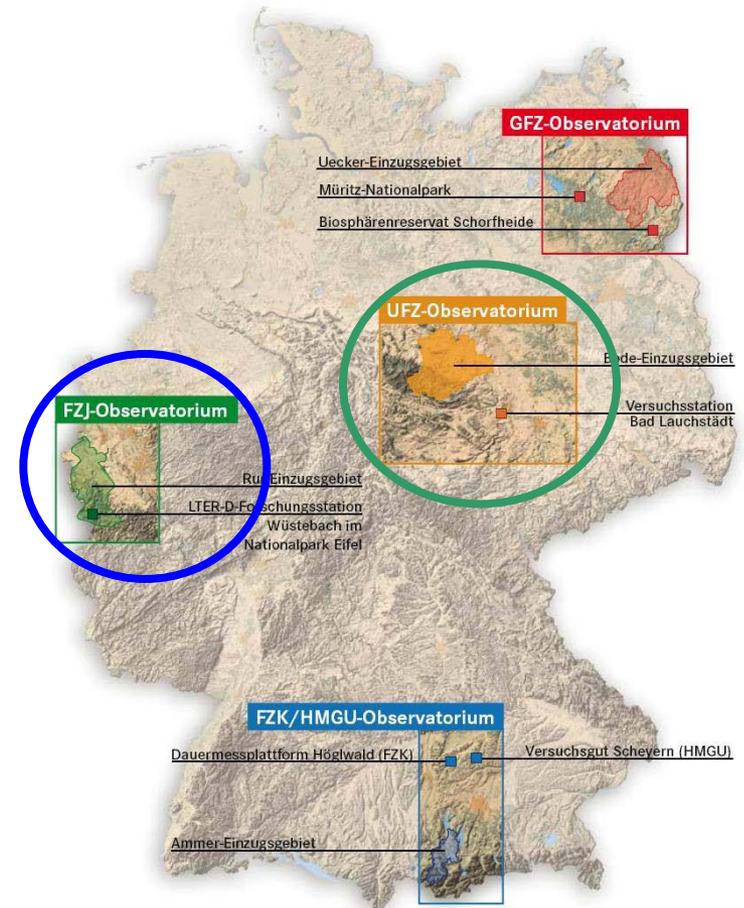
General TERENO data infrastructure design





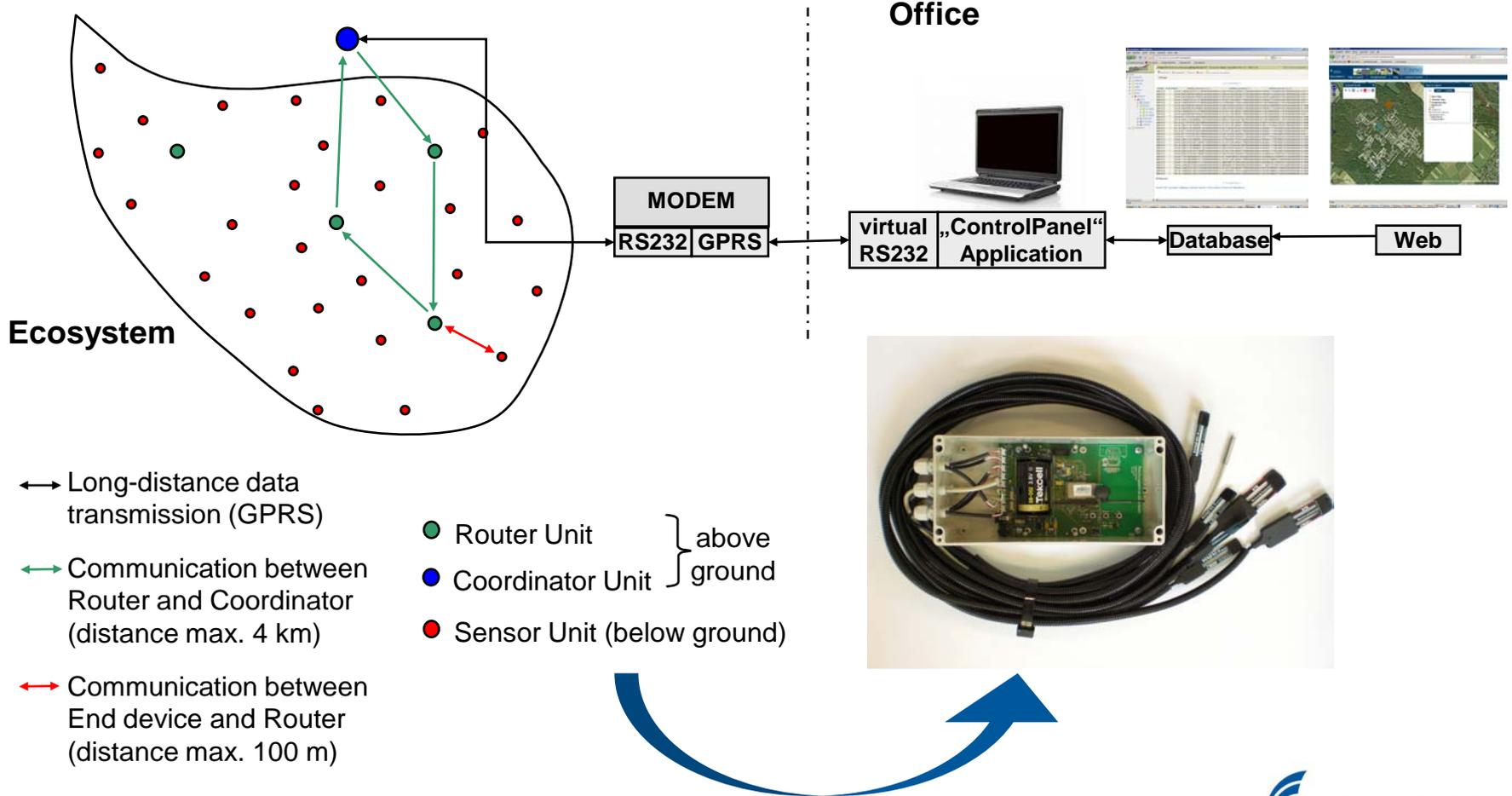
Pilot projects

- Three pilot projects already established to develop and test
 - Local data infrastructure for meteorological, hydrological and pedological data
(FZJ – Eifel / Lower Rhine Valley Observatory)
 - Local data infrastructure for biodiversity data
(UFZ – Harz / Central German Lowland Observatory)
 - Data communication and data exchange
(all observatories, coordination FZJ)



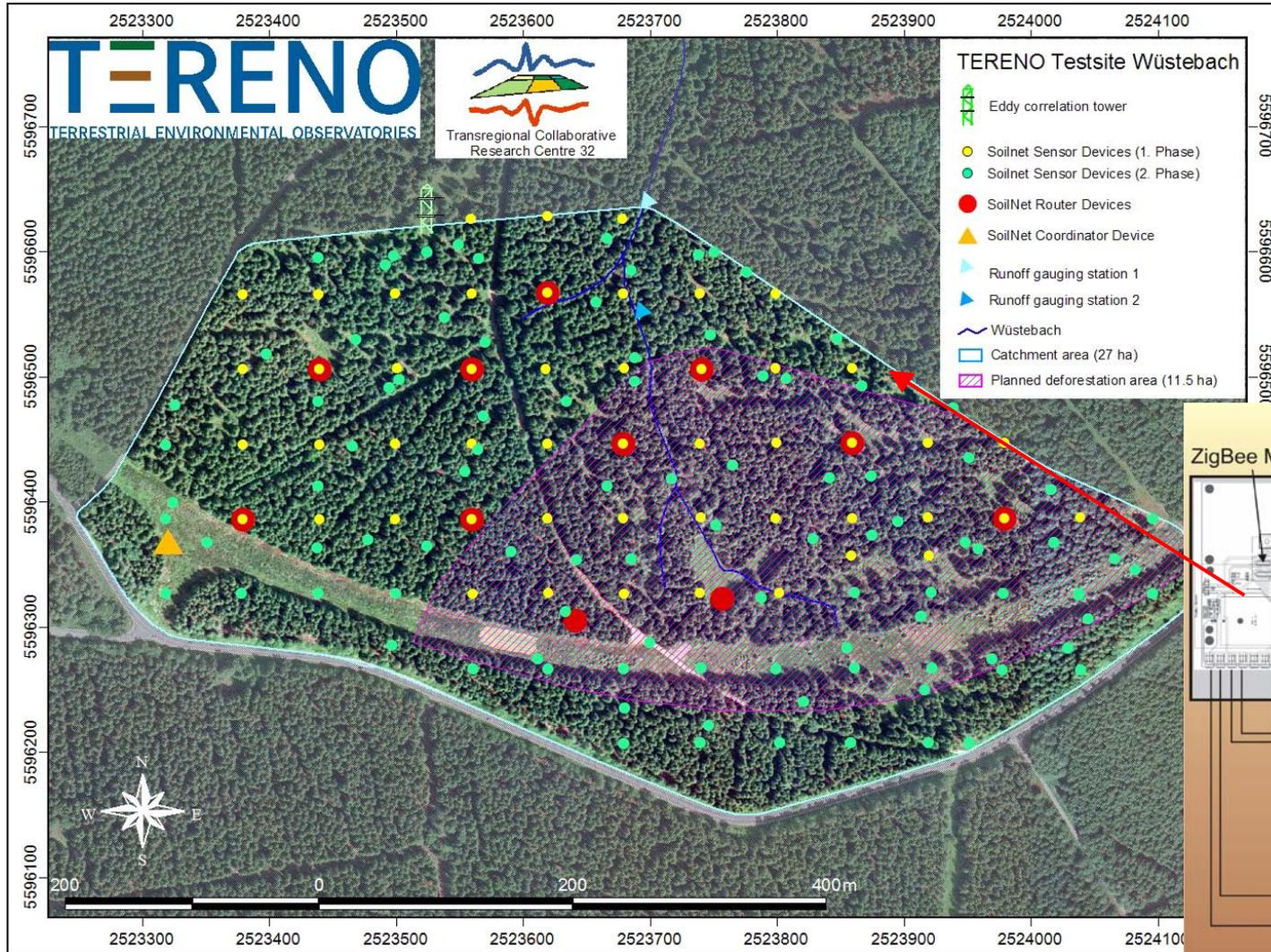


Wireless sensor network technology for online data access to large numbers of sensors, e.g. SoilNet

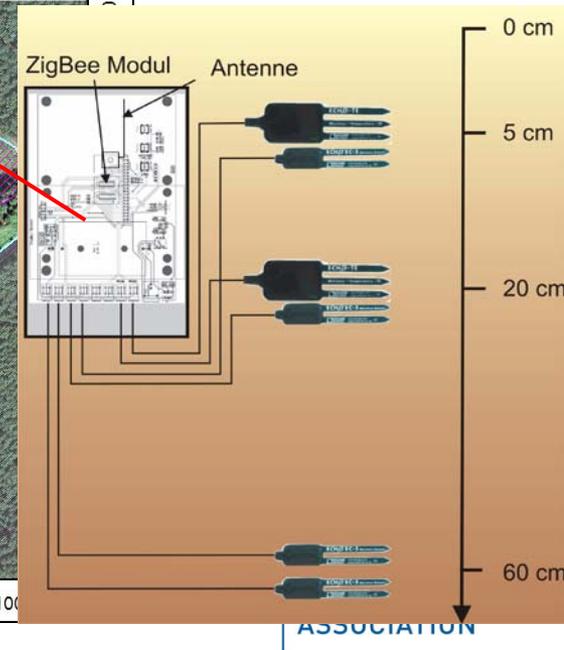




Wireless network configuration at the Wüstebach experimental catchment

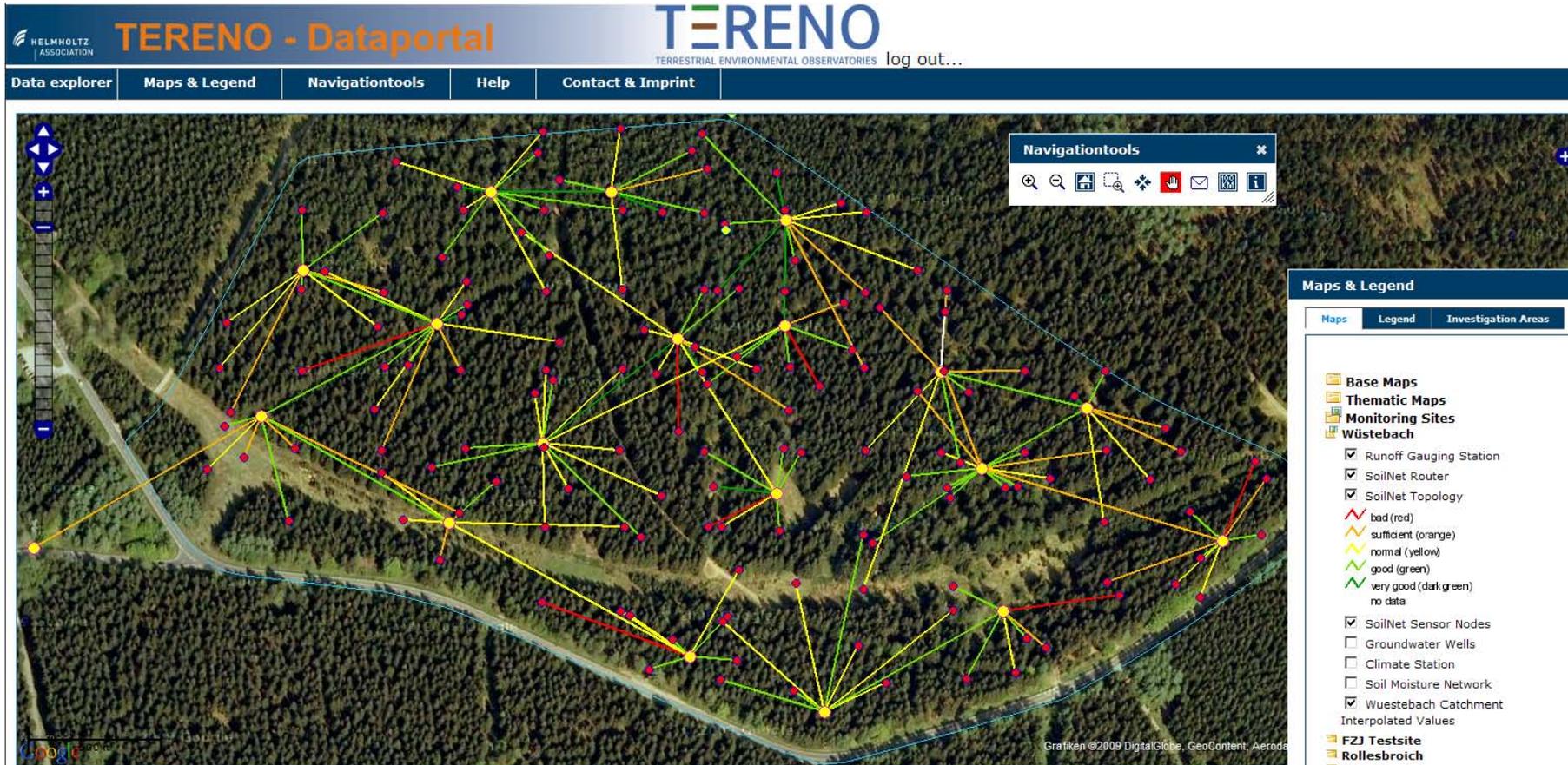


150 SoilNet nodes
71 nodes: 60 m raster
79 nodes: randomly within each raster grid





TERENO Dataportal: SoilNet topology and signal quality



The TERENO Dataportal – A web based data management and visualization open source software



TERENO Dataportal: Data visualization and access

The screenshot displays the TERENO Dataportal interface. The main map shows a satellite view of a forested area with a color-coded interpolation overlay. A 'Navigationtools' panel is visible on the left side of the map. Below the map is the 'Maps & Legend' panel, which includes a list of monitoring sites under the 'Wüstebach' category. The 'Wüstebach' category includes: Runoff Gauging Station, SoilNet Router, SoilNet Topology, SoilNet Sensor Nodes (checked), Groundwater Wells, Climate Station, Soil Moisture Network, and Wüstebach Catchment (checked). Other categories include 'FZJ Testsite', 'Rollesbroich', and 'Schöneseiffen'. On the right side, a control panel allows users to select a field of investigation (Wüstebach), an attribute (moisture_percent_ec_5_1), an interpolation method (IDW), an aggregation method (Averaged value), a grid resolution (2 m), and a time period (Start: 16-10-2009, End: 14:00). The control panel also includes options for raster and movie generation, such as selecting a contour distance (0.5 m) and a runtime (2). A '... create raster' button is located at the bottom of the control panel.



TERENO Dataportal

TERENO - Mozilla Firefox

Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe

http://tereno.icg.kfa-juelich.de/mapbender/client/index.p...

Erste Schritte Aktuelle Nachrichte...

HELMHOLTZ ASSOCIATION **TERENO - Dataportal**

Data explorer Maps & Legend Navigationtools

Navigationtools

Maps & Legend

Maps Legend Investigation Areas

- Base Maps
- Thematic Maps
- Monitoring Sites
 - Wüstebach
 - Runoff Gauging Station
 - SoilNet Router
 - SoilNet Topology
 - SoilNet Sensor Nodes
 - Groundwater Wells
 - Climate Station
 - Soil Moisture Network
 - Wüstebach Catchment
 - Interpolated Values
 - FZJ Testsite
 - Rollesbroich
 - Schöneseiffen

http://tereno.icg.kfa-juelich.de - select chart attribute - Mozilla Firefox

TERENO - Dataportal

Please select gauging station:
Wüstebach

Barchart
 Create barchart for precipitation?
Please select type of precipitation: acc. precip.

min y-axis 0 max y-axis 500
Please select color: [blue]

Please select an attribute for rendering your chart:
battery voltage
samples
water level
discharge [l/sec] **selected**
el. conductivity
pH
oxygen [%]

Please select the time period to visualize:
Start 16-1-2009 14:00 End 16-7-2009 16:00

Graph visualisation Tabular visualisation
width(px): 600 height(px): 400

NAME	COLOR	LINE WIDTH	DASHED?	MIN Y-AXIS	MAX Y-AXIS
lsec	black	1.2	<input type="checkbox"/>		
us	red	1.2	<input type="checkbox"/>		

... create graph

Übertrage Daten von tereno.icg.kfa-juelich.de...

terpolation - Mozilla Firefox

O - Dataportal

raster only:
Please select contour distance [m]
0.5

movie only:
Please select runtime of each raster
2
Please select timesteps for aggregation
Daily
End 16-10-2009 16:00



Data policy

Possible approach:

- Data sets are categorized into different processing levels (e.g. level 0: raw data, level 1: automatically processed data, level 2: visually inspected data, level 3: gap filled data)
- Measurement data is divided into monitoring and experimental data
 - Full access to standard monitoring Level 0 and 1 data (e.g. climate station)
 - Limited access to specific experimental higher level data (e.g. CO₂ flux data)
- Options to react to data requests:
 - Passing data without terms and conditions
 - Passing data with acknowledgement
 - Passing data with co-authorship
 - Passing data after a specific timeframe (e.g. 3 years)
 - Passing data denied (must be justified)