



DEMMIN

Test site for calibration and validation of remote sensing missions, sensors, data and value added products

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Content

General conditions of remote sensing

- Fleet of Earth observation systems for GMES
- Analysis of conditions and test sites designed for remote sensing

Observatory characteristic needed for remote sensing

- Site characteristic and natural conditions of test site DEMMIN
- Heterogeneity of test site conditions

Data basis of observatory DEMMIN

- Data basis derived from precision farming management
- Scientifically campaigns by airborne / space borne remote sensing

Potential for cooperation

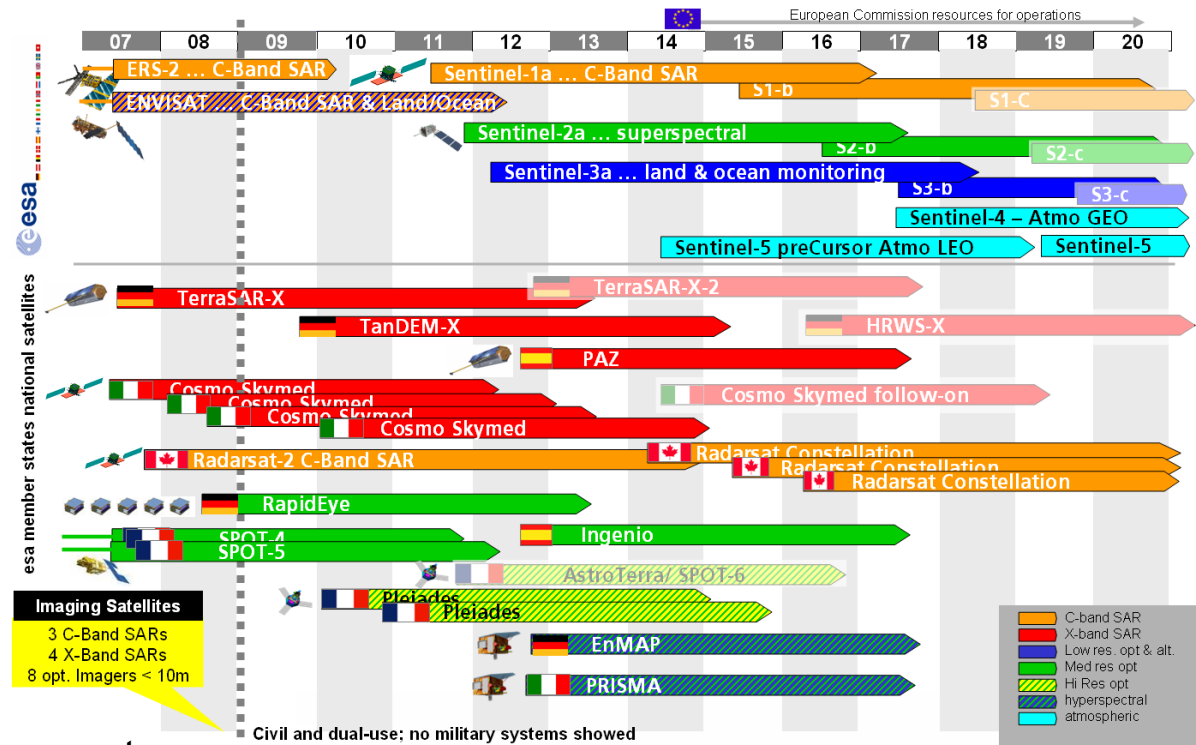
- Integration of the test site in national and international programs
- Cooperation aspects



Development of Remote Sensing



GMES Fleet of Earth Observation Satellites



Development of space segment in the framework of European Earth observation in period 2006 to 2020. (Schreier et al., 2009)

Deficits / Problems of Remote Sensing



Information requirements of users:

- Repetition rate is often too low for time-critical applications,
- Duration of processing of value added product is often too long,
- Continuous quality of value added products is often insufficient
- Standardization of information is insufficiently developed

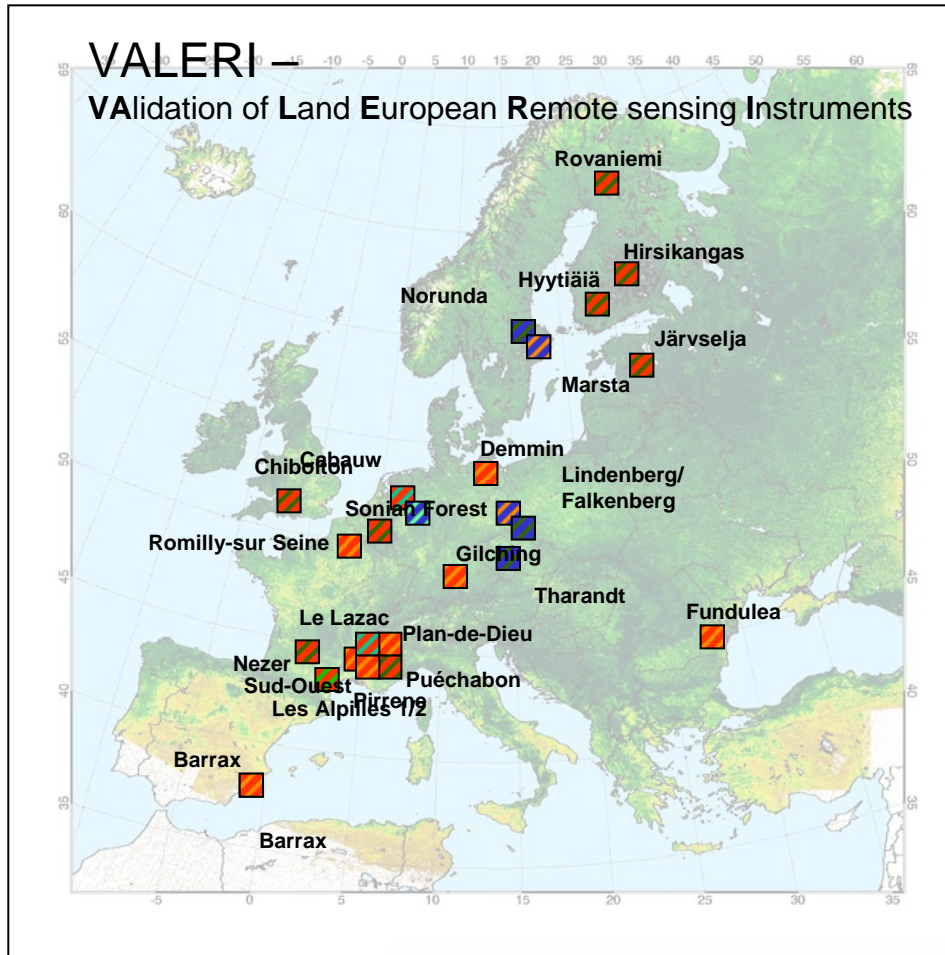
Calibration/Validation aspects concerning remote sensing:

- Insufficient standardization of in-situ-data (statistical basis is often too small)
- Insufficient amount of available in-situ-data (in kind and quantity)
- Unqualified measuring strategies for calibration / validation of remote sensing data

Operational stage of applications in the remote sensing:



- Processors are often prototypically (insufficient operationally usable),
- Insufficient validation strategies for operational processors

A Test Site for Remote Sensing?



Operational Test Sites In Europe

Thematic Objective

-  Meteorology
-  Remote Sensing

Land Use

-  Meadow / Pasture
-  Wood / Forest
-  Natural Vegetation
-  Crops

Analysis Moment

2009

Requirements for a Remote Sensing Observatory



Cooperation partners

- Agricultural companies
- Universities, colleges of technology

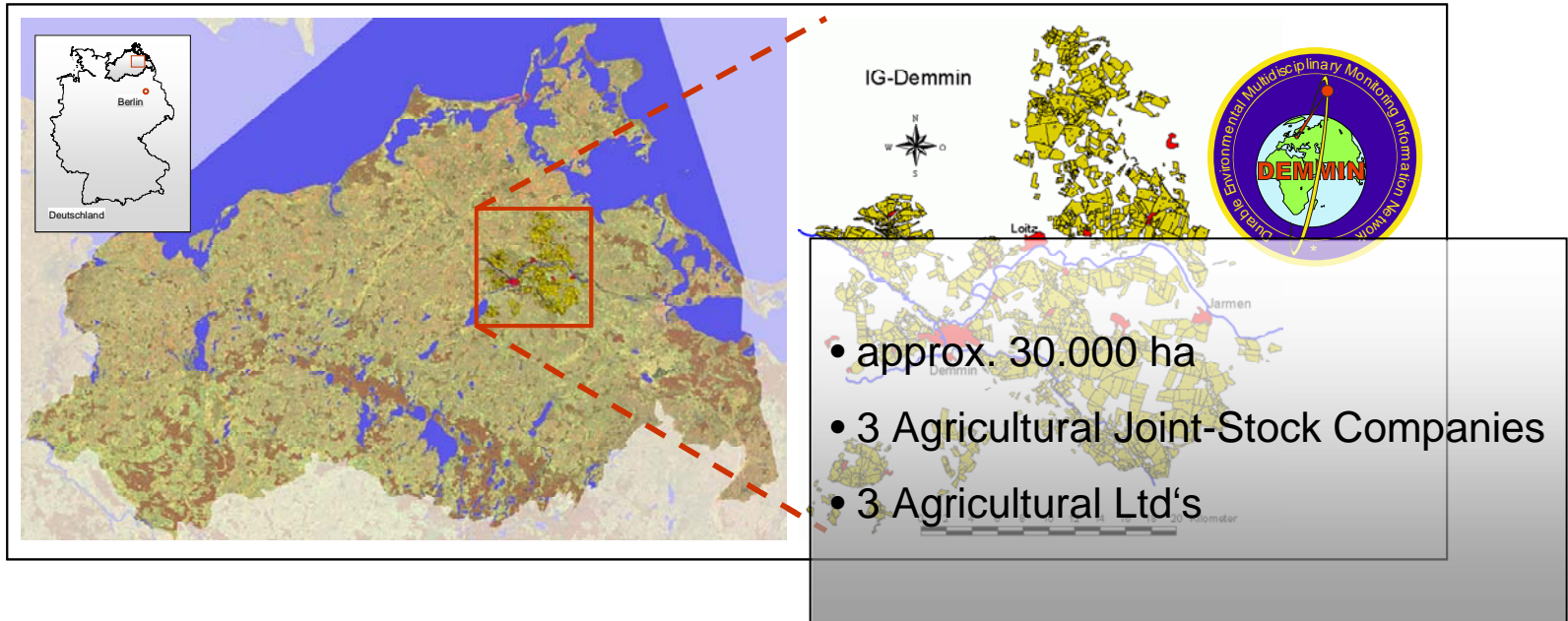
Local and regional preconditions

- Natural environmental configuration (agricultural, forestry, and environmental)
- Local variability of environmental site parameters vs. field size (statistical basis)
- Variability of the land use within the test site (characteristically for a larger region)

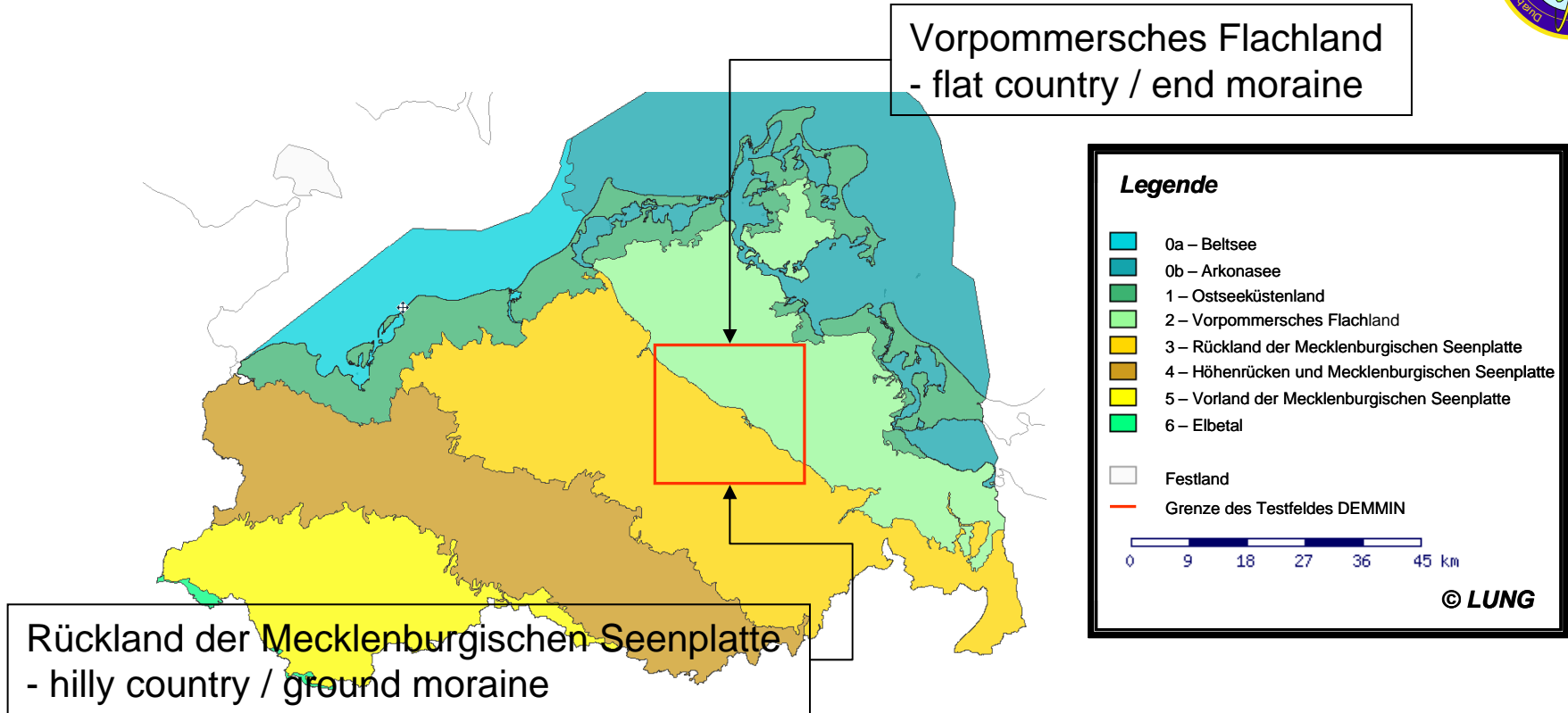
Technical requirements

- Automated measurement and archiving of environmental parameters
- Calibration equipment for operational remote sensing missions (automated)
- Control and quality check of data processing procedures

Durable Environmental Multidisciplinary Monitoring Information Network (DEMMIN)



Landscape Zones



Formation of observatory DEMMIN with respect to landscape zones

(<http://www.umweltkarten.mv-regierung.de/script/>)

Hydrology



characterized by

- diffuse, undeveloped water network,
- internal drainage areas,
- innumerable lakes,
- many bifurcation,
- numerous hollow forms (germ: sölle)

Rivers: Trebel, Tollense, Peene

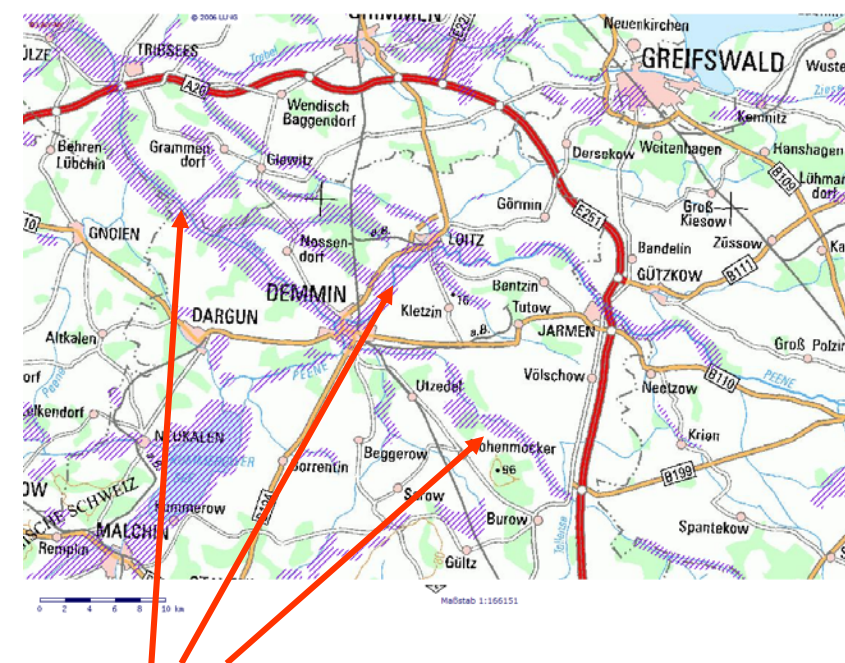
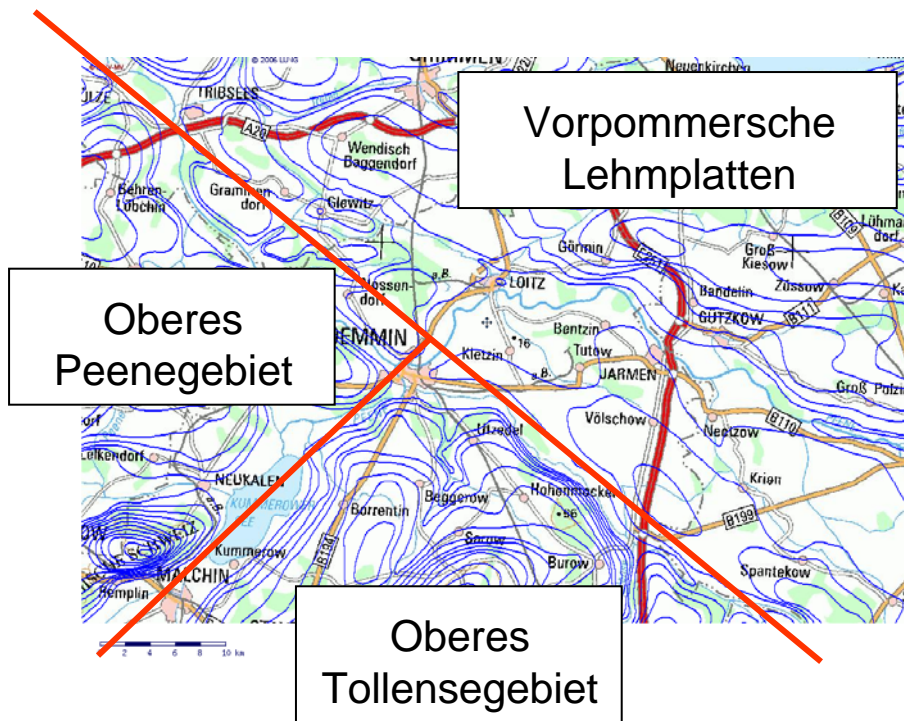
Lakes: Kummerower lake - 0.2 m over NN
Malchiner lake - 0.6 m over NN

Peene: approx. river depth 2 - 3 m;
approx. river slope (Malchin to Peene
mouth 0.03%)

Peene in the region of old peat-ditches. Especially notable are the natural meander.

Natural peat bogs formed by through flow along Peene

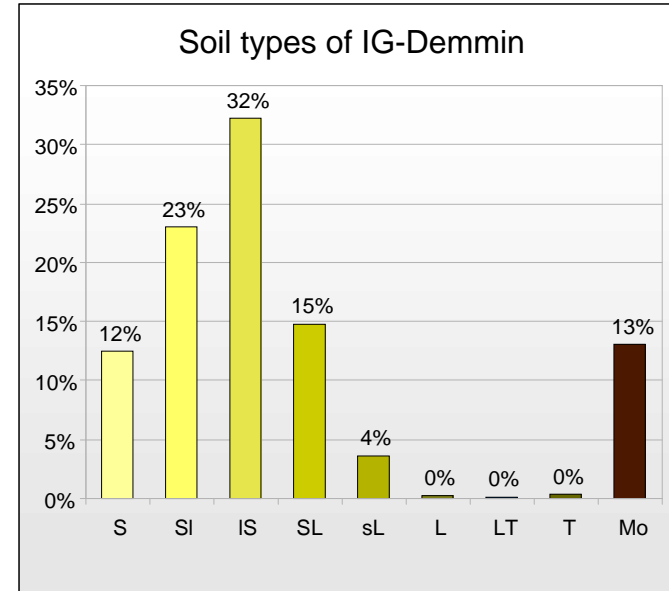
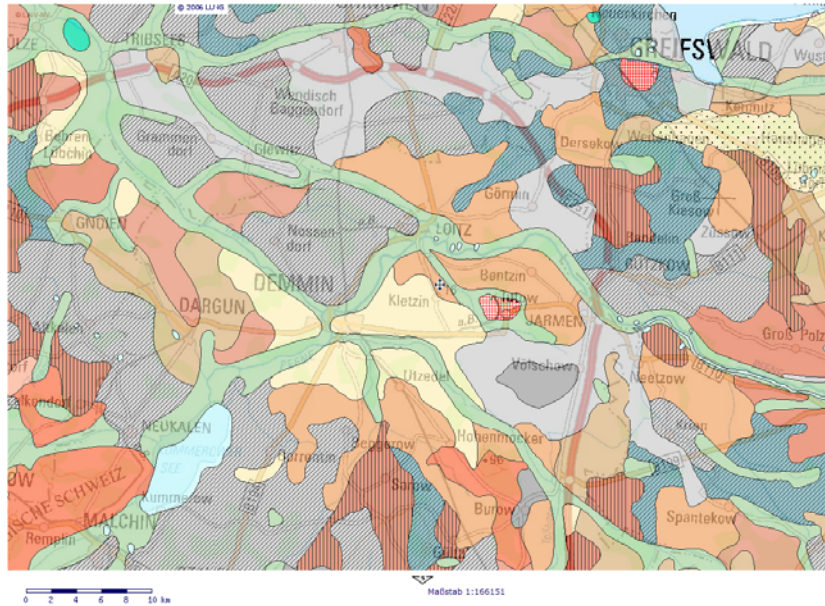
Hydrology- Ground water



Isolines of ground water depth in DEMMIN
 (<http://www.umweltkarten.mv-regierung.de/script/>)

Artesian areas in DEMMIN
 (<http://www.umweltkarten.mv-regierung.de/script/>)

Soil Cover



Heterogeneity of soil cover within the test site DEMMIN. Sandy and loamy soils are dominant.

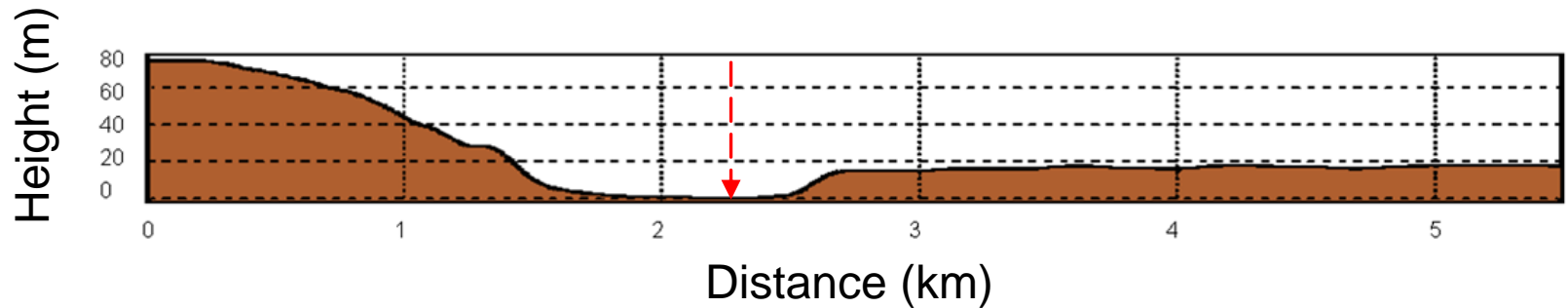
(<http://www.umweltkarten.mv-regierung.de/script/>)

Proportional quotas of the soil type in IG DEMMIN.

Relief

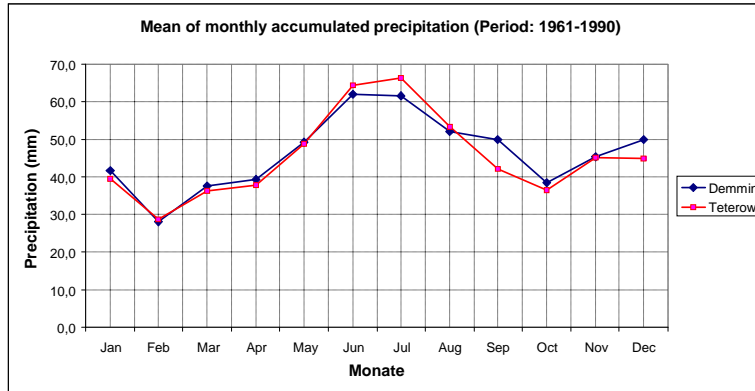


Look in the Tollense valley near the village Buchholz

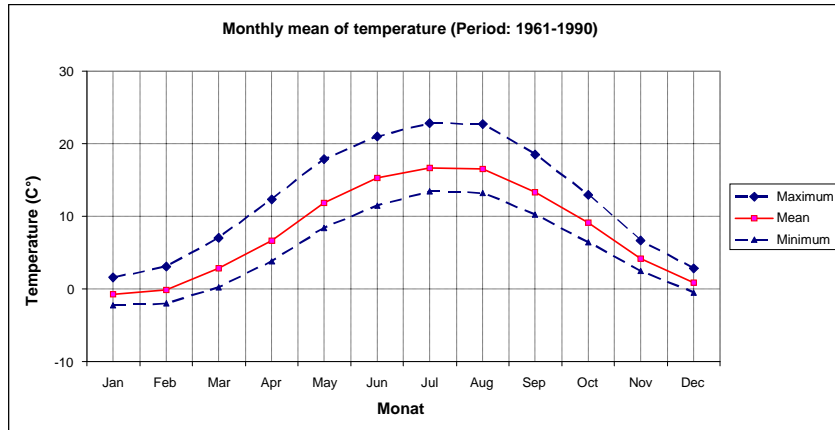


Altitude profile across along the look in the Tollense valley. The red Pointer assigns the river bed of the Tollense river.

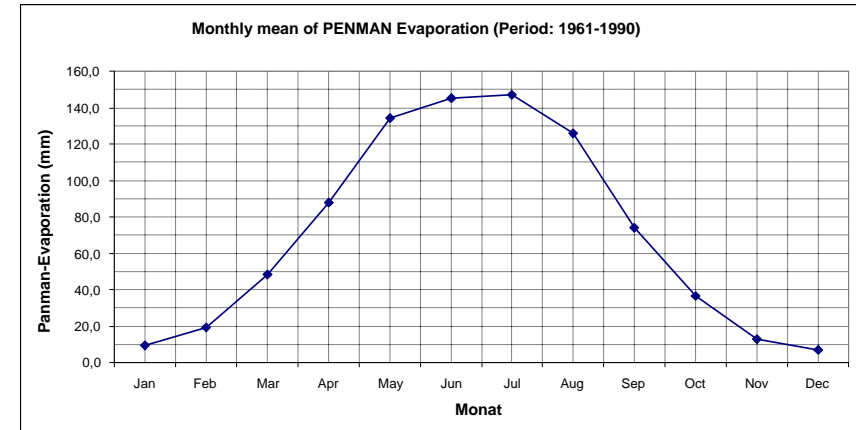
Climatic Conditions



Longtime mean of monthly accumulated precipitation measured by weather station Demmin and climate station Teterow of DWD (Period 1961-1990; DWD, 2006)

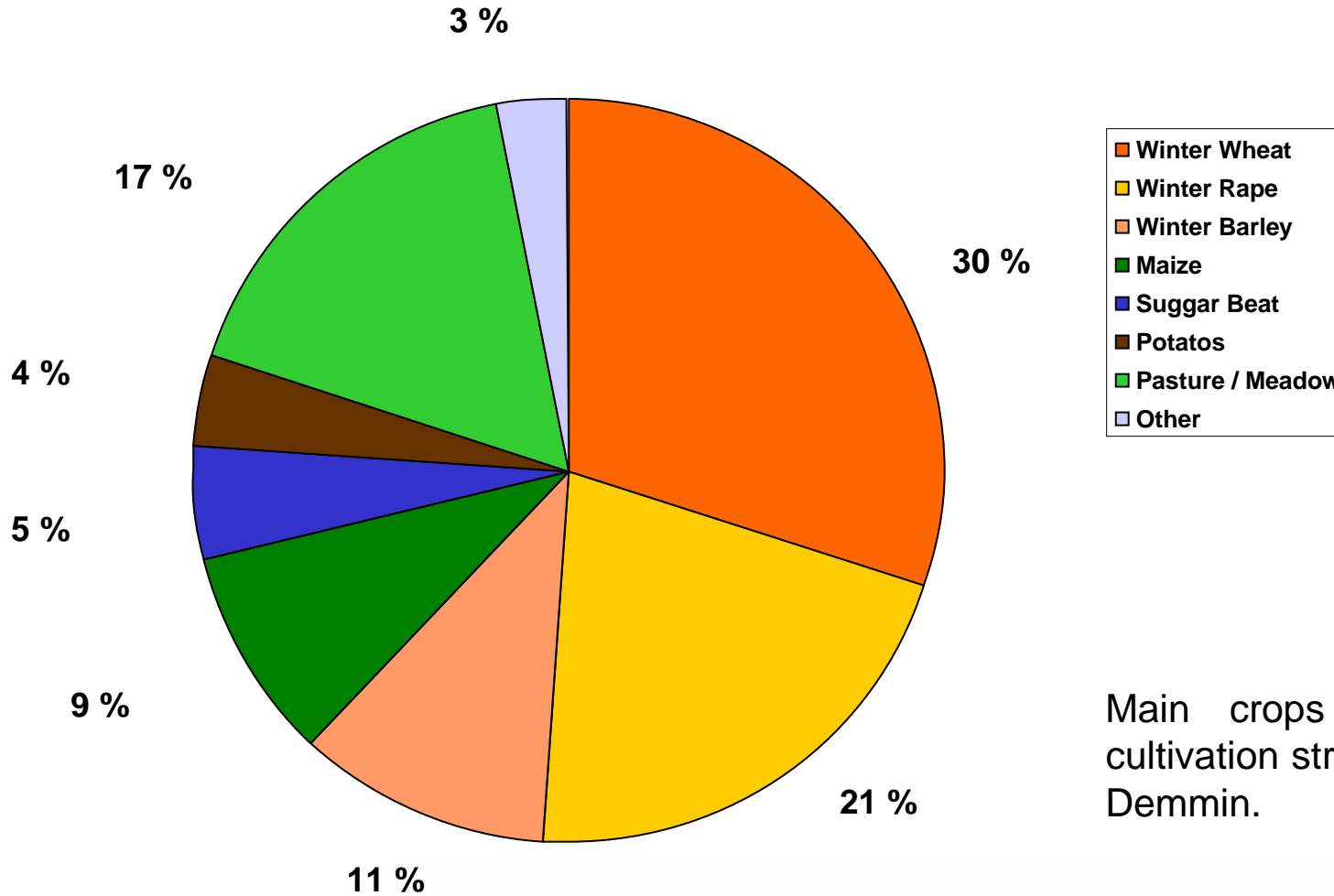


Longtime monthly mean of temperature measured by DWD climate station Teterow (Period: 1961-1990; DWD, 2007)



Longtime monthly mean of PENMAN evaporation measured by DWD climate station Teterow (Period: 1961-1990; DWD, 2007).

Cultivation Structure of IG Demmin

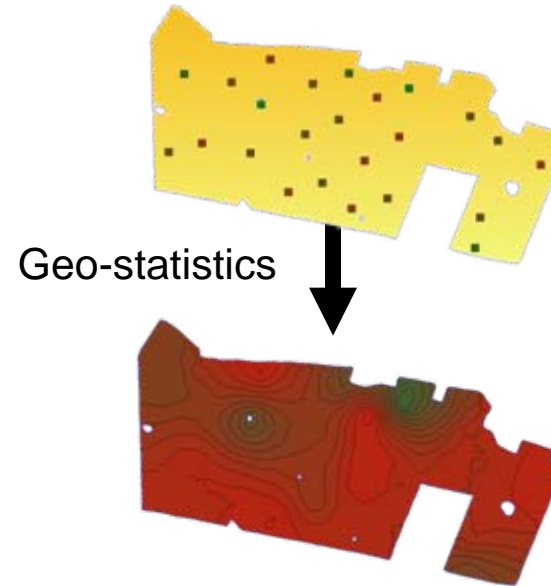


Main crops and average cultivation structure of the IG Demmin.

Data Availability by Precision Farming Techniques



Yield-Measures



Geo-statistics

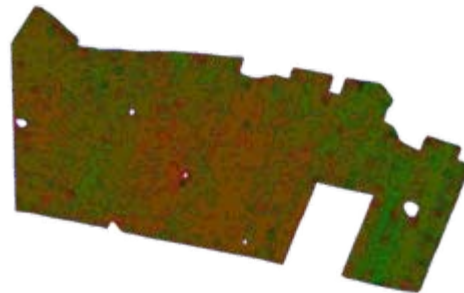


N-sensor for measuring Nitrogen content of crops

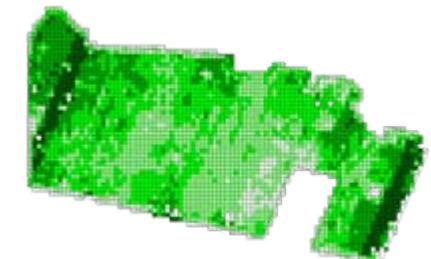
Regular soil investigation
(cycle 4 years)



Em38 – Soil conductivity



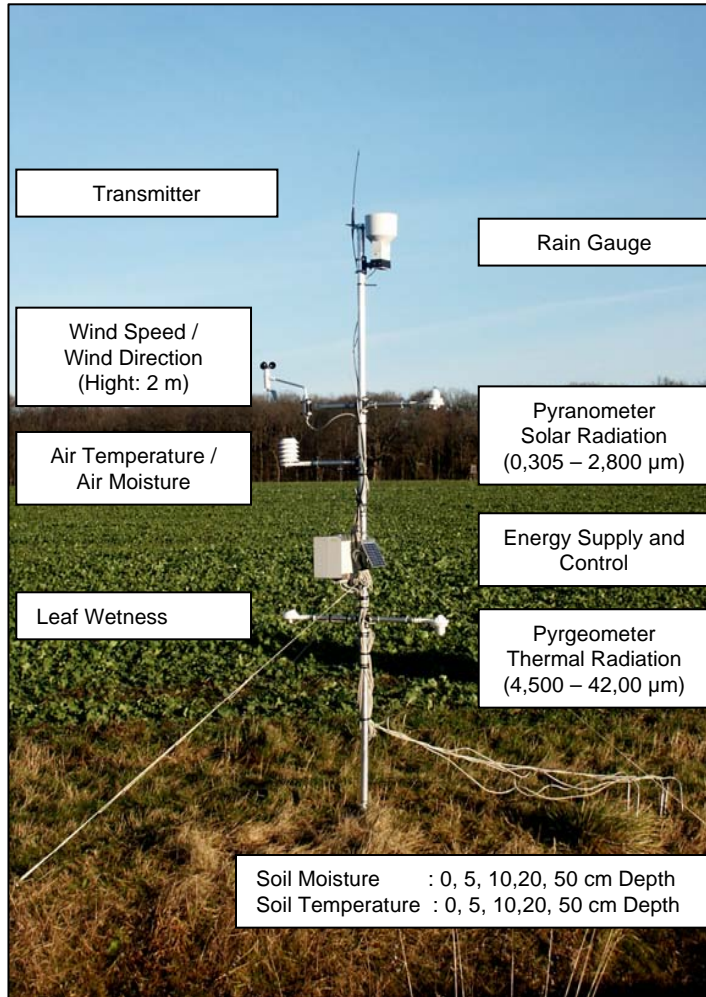
Yield mapping



N-Sensor / Biomass

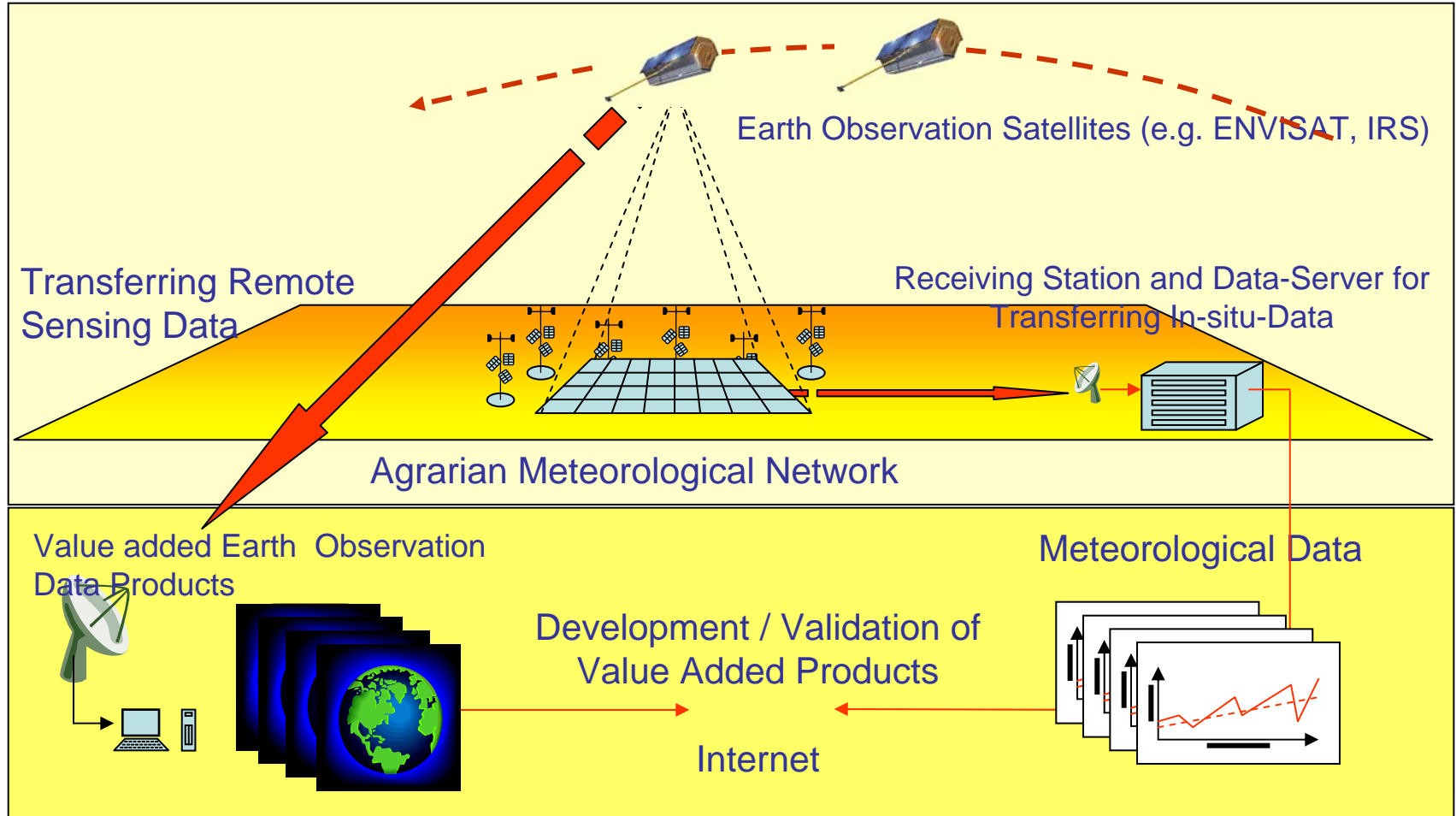


Automatic Meteorological Network

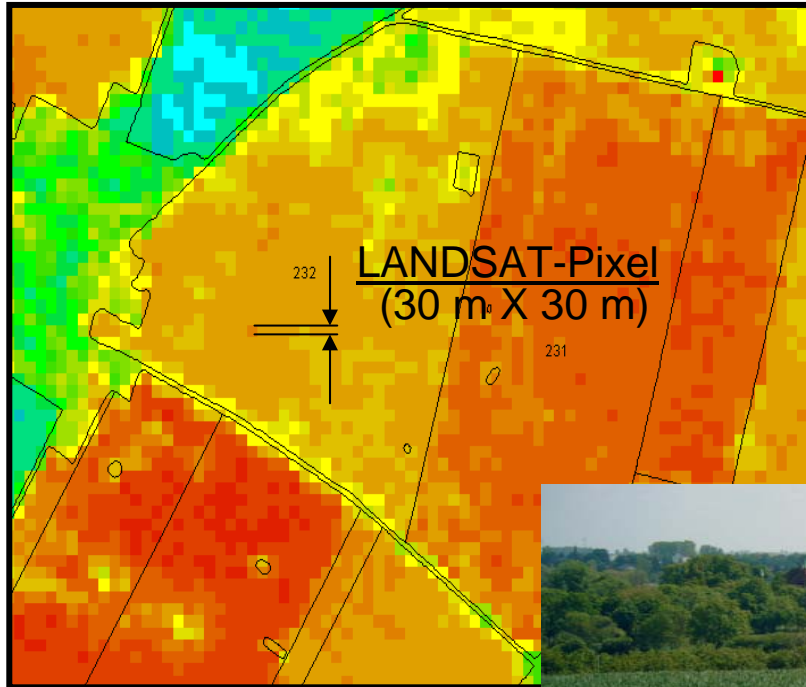


- 16 meteorological stations
- measurement interval 15 minutes (programmable)
- data transfer between meteorological station and data server is realized by telemetry transfer
- web-based data access on data server

Automatic Meteorological Measurement Network



Validation of Remote Sensing Data



LANDSAT 7 / ETM+



Plant height / density



Leaf Area Index

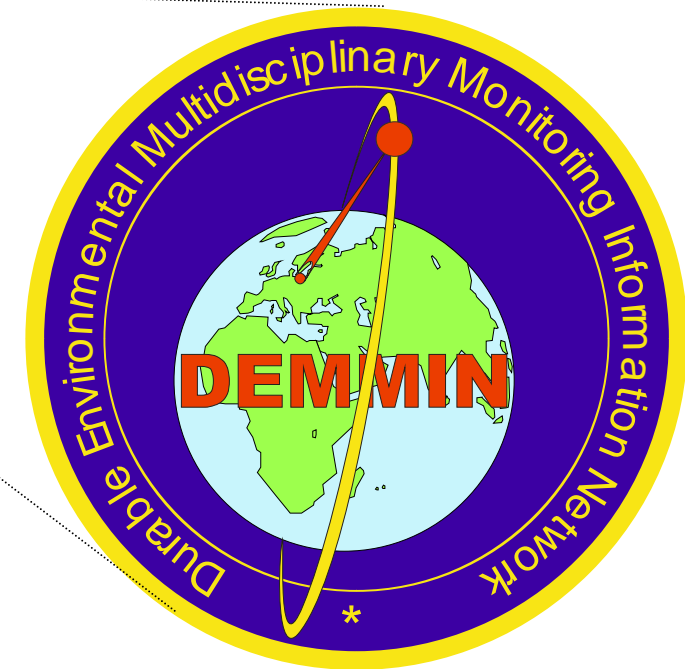
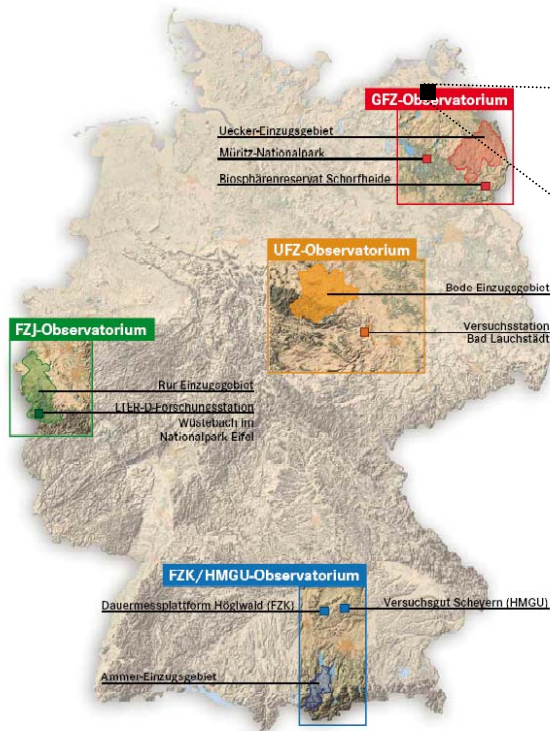


Available Data Basis of DEMMIN



Temporal Scale		Spatial Scale		point	field	region	over-regional
sporadic data				biomass, leaf area, (destructive), plant height, plant density, nitrogen, soil parameters, spectrometer measurements	electric soil conductivity	ESAR- flight campaigns	satellite flights (campaigns)
dynamic data	quasi-continuous data	over-seasonal data		annual field campaigns: measurements of soil vegetation parameters, spectrometer measurements	micro- / macro nutrients	annual hyperspectral flights (z.B. HyMap)	
		seasonal data			crop structure application data yield data vegetation stages	field database cultivation data application data yield maps	satellite data (operative systems)
	continuous data	daily data		agro-meteorological data soil moisture / temperature			satellite data (operative systems)
permanent data	quasi-static data				field geometrics drainage maps		
	static data			soil samples (substrate)		geology, soils, hydrology, morphology	geology, soils, hydrology, digital elevation model

Development of DEMMIN



Deutschlandkarte mit den Untersuchungsgebieten von TERENO:

- **Croßraum Leipzig-Halle**
Koordination: Helmholtz-Zentrum für Umweltforschung
- **Region Eifel-Niederrheinische Bucht**
Koordination: Forschungszentrum Jülich
- **Alpen- und Alpenvorlandregion**
Koordination: Forschungszentrum Karlsruhe und Helmholtz Zentrum München
- **Nordostdeutsches Tiefland**
Koordination: Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum.

The Test site DEMMIN is listed in the following catalogues:

USGS
TERENO
ESA

http://calval.cr.usgs.gov/sites_catalog_template.php?site=demm
<http://www.tereno.net>
<ftp://pcf:Ciqcsp01@uranus.esrin.esa.int/PH/Deliverables/>



Potential of Cooperation

Calibration / Validation:

- Remote sensing sensors,
- missions,
- processors,
- processing chains,
- products,
- data for environmental models

Campaigns

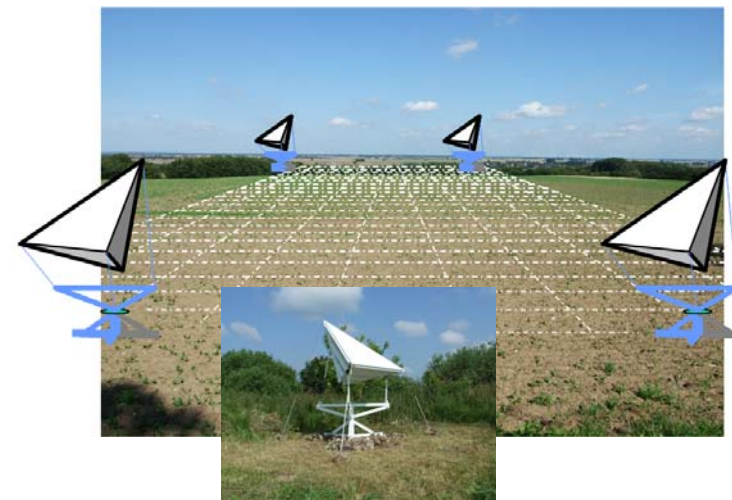
Thematic objectivities:

- Biomass modeling
- Balance of carbon
- Hydrological parameters
- Soil parameters

Development

Processors, Data, Products:

- Development / Implementation
- Calibration / Validation



http://calval.cr.usgs.gov/sites_catalog_template.php?site=demm

<http://www.tereno.de>



Literature



Papers:

Schreier, G., Diedrich, E., Mikusch, E., Maass, H. (2009).- The Earth Observation Ground Segment of DLR in GMES.- In: 33rd ISRSE - International Symposium on Remote Sensing of Environment.- Sustaining the Millenium Development Goals, Stresa, Lago Maggiore, Italy.- TS-15-6 (ref 252).- <http://isrse-33.jrc.ec.europa.eu>.

Borg, E., Lippert, K., Zabel, E., Löpmeier, F.J., Fichtelmann, B., Jahncke, D., Maass, H. (2009): DEMMIN – Teststandort zur Kalibrierung und Validierung von Fernerkundungsmissionen.- In: 15 Jahre Studiengang Vermessungswesen – Geodätisches Fachforum und Festakt, Neubrandenburg, Eigenverlag (Hrsg.: Rebenstorf, R.W.).- 16.-17.01.2009.- S. 401-419.

Web-Sites:

<http://www.umweltkarten.mv-regierung.de/script/>

http://www.dwd.de/bvbw/appmanager/bvbw/dwdwwwDesktop?_nfpb=true&_pageLabel=dwdwww_st art&T3200039671164966383319gsbDocumentPath=Navigation%2FOeffentlichkeit%2FKlima__Um welt%2FKlimadatenzentren%2FNKDZ%2Fkldaten__akt%2Fausgabe__mittelwerte__node.html__nn n%3Dtrue



Thank you for your attention !



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