The climate and soil moisture network at TERENO Northeastern German Lowland Observatory - DEMMIN

The goal of the TERENO initiative is the long-term monitoring and documentation of proposed climate change, changes in land use, social-economic developments and anthropogenic influences on terrestrial ecosystems. Therefore long-term observations of multitemporal environmental parameters at different scale are the basis for gathering information on changes of the available water resources, material flows, or further ecological changes. The Durable Environmental Multidisciplinary Monitoring Information Network (DEMMIN®) located in the North-east of Germany was installed by German Aerospace Center in 1999 for Calibration and Validation of Remote Sensing data at agricultural areas. Due to its physiographic composition and typical agricultural management the area is a perfect test site for monitoring of relevant environmental parameters. Since 2009 the DEMMIN test field of 50 x 50 km is part of the Northeastern German Lowland Observatory (TERENO-NE), which is coordinated by Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences.

Because of the remote sensing focus of the DEMMIN test sites it is a perfect area to evaluate the potential of linking ground based in-situ data with remote sensing data analysis with view to the COPERNICUS initiative of the European Union (EU) and the European Space Agency (ESA).

Area Based Environmental Parameter Products

Agro-meteorological Data

It is in development to produce daily maps of relevant environmental parameter based on the acquired data of the agro-meteorological network calculated by using GIS analysis. In dependence of the parameter the data of the point measurements are combined with information retrieved from DEM, vegetation information based on remote sensing data or soil information (soil maps + remote sensing data analysis).

Remote Sensing Data

The Demmin test site is excellent observed by diverse remote sensing sensors about 50 observations / year:

- Multispectral Data (e.g. RapidEye, Landsat)
- Hyperspectral Data (e.g. HySpex, AISA)
- Thermal Data (e.g. VarioCarri)
- Microwave Data (e.g. TerraSAR-X)

Soil Moisture Network

62 soil moisture gauging stations are installed within the TERENO project. Each station is equipped with 6 SPADE sensors with measuring depths of 50cm (4x) and 70cm (2x). The gauging stations are located below agricultural fields to analyse the impact of different land use on soil water conditions. In addition the soil characteristics are documented (~120 profiles) laboratory analysis.

Soil Moisture Data

The soil moisture data are analysed with regard to the impact of the site specific soil conditions and crop type and crop cover. The results show strong relationship between soil water content and crop type (top). The soil of winter barley (root zone up to 70cm depth) dries faster compared to the soil with rapeseed (root zone up to 150cm). Lower picture shows data of different SPADE sensor installation depths.

Soil Moisture Gauging Station – June 2015

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