Activities and Data Sets

Below, examples of the existing data sets are given. In addition to the regular in-situ measurements, model simulations and ancillary satellite data products, a comprehensive data set was gained during the SMOS rehearsal campaign in spring 2008. Two radiometers (EMIRAD, HUT2D) were flown within a multi-week period and extensive ground data was collected.

Examples of regularly collected data

- Precipitation
- Radiometer measurements
- Soil moisture

Examples of data collected during airborne campaign

- METOP-ASCAT and AMSR-E soil moisture products (University of Amsterdam)
- National measurable soil moisture

Analysis Framework

Since 2007, the University of Munich routinely collects in situ soil moisture data at 9 different locations in preparation for the SMOS commissioning phase. A ground based ELBARA radiometer with additional measurement stations has also been installed. An operational framework has been developed to compare SMOS soil moisture products against in situ measurements, land surface model simulations and ancillary satellite data. This includes an interactive web client used for visualisation and quality control of all data.

Validation approach

- Radiometer measurements
- Land surface model
- Soil moisture

PROMET land surface model

- Process-oriented multiscale evapotranspiration model (Mauser, 1989)
- Characteristics:
  - Spatially distributed
  - Description of water and energy fluxes
  - Grid based
  - Multiscale (point, 1km²)
  - Dynamic vegetation module
- 5 modules:
  - Radiation balance
  - Surface
  - Vegetation (dynamic)
  - Snow (snow cover, wetness)
  - Soil (4 layers, soil moisture, temperature)

Visualisation and quality control

- Temperature
- Solar radiation
- Meteorological data
- Heat Flux
- Interception
- Transpiration
- N-fertilisation
- N-deposition
- N-leaching
- Infiltration
- Surface run-off
- Capillary rise
- Snow-ice-melt
- Growth
- N-transformation
- Evaporation
- Subsurface
- Recharge
- Water & energy balance

Test Site

The validation of soil moisture products from ESA’s Soil Moisture and Ocean Salinity (SMOS) mission requires the maintenance of long term soil moisture monitoring sites. The Upper Danube catchment, situated mostly in Southern Germany, was chosen as one of two main test sites in Europe for the SMOS cal/val activities. Its main part is situated in the alpine foreland with heterogeneous land cover and large natural gradients from the Alps northwards. Best soil moisture retrieval performance is expected in the smaller catchment of the river Vils, because there are neither open water bodies nor large urban areas and terrain as well as soil texture are fairly homogeneous. The Vils reference site is equipped with a more dense network of currently 5 soil moisture measuring stations as it is the focus of flight campaigns and studies of scaling issues.