CLOSING THE YIELD GAP WITH CALIBRATED CROP MAPS FROM GERMANY

Biomass maps from Copernicus data help accounting crop yield information in the Demmin region in Germany.

The challenge

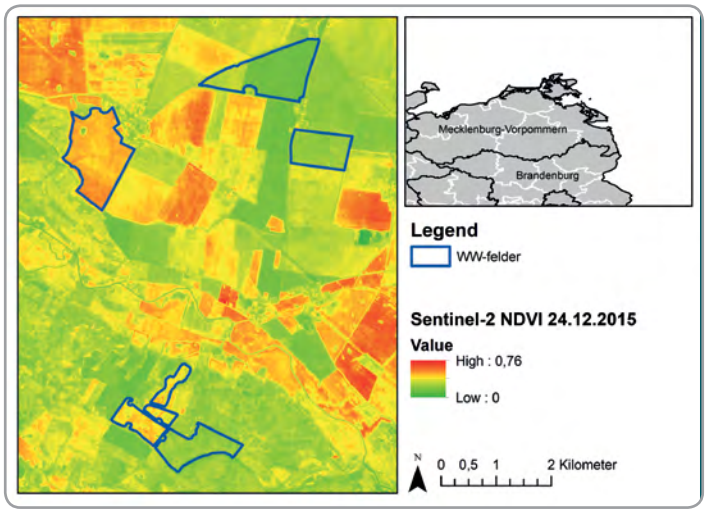
Crop yield monitoring is a major challenge in agricultural production. The knowledge of the yield condition is key for the sustainable management of agricultural lands and an important source of information for economic planning and price development in Northern Germany. The challenge is to overcome existing yield gaps by using operational space-based monitoring services as provided by the Copernicus Missions. Up-to-date spatial information and indicators on the ecological status of managed ecosystems provide knowledge for increasing cropping yields on existing agricultural systems. Despite limited land resources, efficient farming practices and the wise use of water resources for irrigation is a major challenge for land managers on a regional scale.

The space based solution

Satellite-based remote sensing enables an objective and repeated assessment of the agricultural landscape. It offers a perspective that is not influenced by property or administrative boundaries and thus helps to understand the processes in a coherent environmental system such as an agricultural landscape. The Earth Observations of the Copernicus Programme are free of charge and provide high-resolution, high-frequency, detailed information about the land surface to everyone. The richness of remote sensing data helps to obtain up-to-date information on farmland and agricultural processes. Vegetation indices such as the NDVI, in combination with land use and empirical models, using in-situ data are used to estimate high and low productive areas in a field. In combination with the high frequency of remote sensing observations, this information is used to assess the effectiveness of agricultural management steps.

Benefits to Citizens

Satellite-based agricultural monitoring provides information on the condition of agricultural land. Despite the detection of areas with limited productivity, satellite data analyses provide a holistic picture on the environmental condition of managed landscapes. Examples are drought monitoring and soil moisture maps as well as maps indicating the health status of the crops for each specific field. The satellite data provide key information for adapting fertilisation practices, crop cycles, and show the success of agricultural practices. Existing archives of satellite-based agricultural conditions also help to understand slow environmental processes like soil degradation and effects of soil erosion. These maps are very useful to understand deficits in land management and provide decision making support for on-site applications and adaptions to changing conditions. Agricultural map products on biomass, crop health and yield estimates support traditional management practices since they provide spatially consistent and cost-effective information



Illustrates how NDVI maps derived from Sentinel-2 can be used as indicators to determine high and low productive parts of a crop field.

Thematic Area: AGRICULTURE, FOOD, FORESTRY AND FISHERIES

Region of Application: MECKLENBURG-WESTERN POMERANIA (DEMMIN)

Sentinel mission used: S1, S2, S3

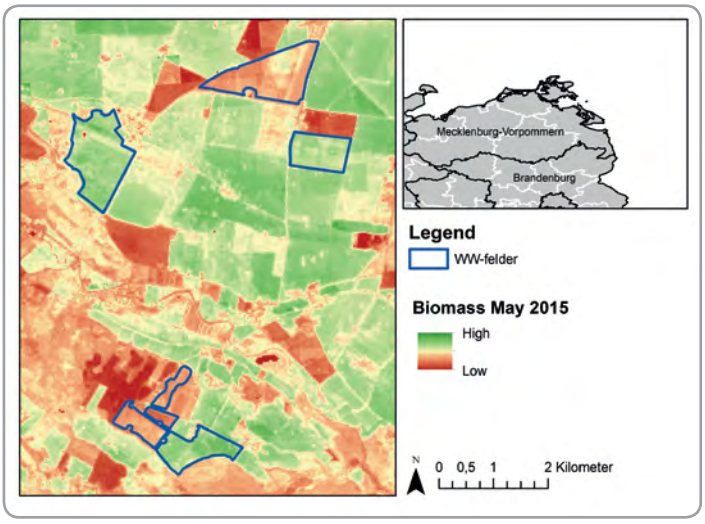
Copernicus Service used: –

Usage Maturity Level: 3

for land managers. Consequences are better use of fertilisers and increased productivity by reducing the uncertainty of crop damage events and crop risks. The benefits can be scaled from farm level by supporting better crop yields resulting in stable profits for local wheat producers in the administrative region. Spatial information on wheat conditions are good indicators for the regional wheat markets in Northern Germany. Wise land management practices further foster biodiversity, human health and well-being in the administrative region of Demmin.

Outlook to the future

Crop production is the main industry in Northern Germany. Local farmers will intensify the collaboration with the scientific network of the Durable Environmental Multidisciplinary Monitoring Information Network (DEMMIN) to generate calibrated Earth observation data for agricultural monitoring. Biomass maps will be evaluated by farmers and researchers and integrated into farm management tools.



Shows a result of a light use efficiency model. The model is using high frequent remote sensing data to estimate the generation of biomass per pixel by connecting the spectral information of a remote sensing time series with the real world biophysical information like biomass.

> "Field-specific maps on biomass and vegetation productivity from satellites provide a better planning horizon for field applications and developments on the wheat markets."
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> ***Freiherr von Maltzahn, Daberkower Landhof AG***

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ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.
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