A FARMSOURCING PLATFORM FOR A SMART NITROGEN MANAGEMENT

BELCAM is an EO-based collaborative platform designed for public authorities and farmers for crop monitoring based on the joint use of field observations and Copernicus satellite data.

The challenge

Producers in European countries are under increasing pressure to maintain profitability within environmental constraints and the increases in N fertilisers' prices that should encourage more rational and environmentally responsible management of inputs.

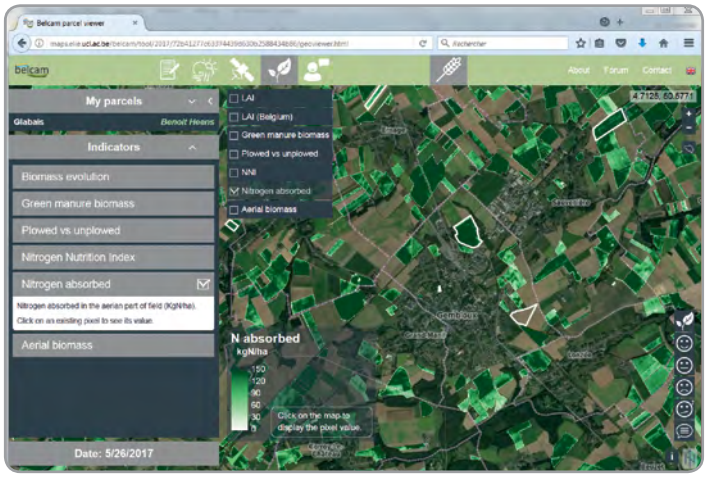
The high spatial and temporal resolution provided by Sentinel missions (mainly Sentinel-1 and -2) paving the way for new local applications on a smaller scale than in agricultural regions or in very large fields has motivated the development of the collaborative farm sourcing platform BELCAM optimising nitrogen management at parcel level based on the joint use of satellite (Copernicus) data, field observations and crop growth models.

The space based solution

Nitrogen (N) is a major element of chlorophyll and enzymes implied in photosynthesis, a shortage results in lower yields whilst an excess has negative environmental consequences (e.g. groundwater pollution). Thus, providing the right doses in the right places and at the right time is crucial. The BELCAM collaborative platform contributes to smart nitrogen management of wheat, potato and maize in Belgium by providing to users satellite-based N recommendations at parcel level. It includes a total N-recommendation at the start of the season but also, throughout the growing season, the crop nitrogen status, the Nitrogen Nutrition Index (NNI) determining the crop N nutrition level and, considering the crop N requirements, the amount of fertilisers to apply. These products are built from surface reflectances (of bands at 10 and 20m) and vegetation indices derived from Sentinel-2 (available every 3-5 days over Belgium) which are used to estimate the nitrogen absorbed by the crops, the crop and green manure aboveground biomass and leaf area index (LAI). With a spatial resolution of 10m, sentinel-2 data can also be used in the delineation of management zones for variable nitrogen application. The collaborative ("farmsourcing") approach of the platform speeds up the critical learning process for the remote sensing providers, thanks to input and near real time feedback from the users.

Benefits to Citizens

The adequacy between the nitrogen supplies and the crop needs allows public authorities to meet European regulations e.g. Nitrates directive). It also meets the societal expectations in terms of good agricultural practices and product quality. Consumers are increasingly concerned about agricultural production that allows farmers to get fair incomes whilst preserving the environment and consumer health. This adequacy allows the minimisation of



Snapshot of the BELCAM collaborative ("farmsourcing") platform - The displayed product is the nitrogen absorbed (kg N ha-1) of winter wheat parcels in the vicinity of Gembloux on the 26th of May 2017 – parcels with border limits in white are those encoded in the platform.
Source: BELCAM project
Credit: Contains modified Copernicus Sentinel data [2017]

Thematic Area: AGRICULTURE, FOOD, FORESTRY AND FISHERIES

Region of Application: BELGIUM

Sentinel mission used: S2

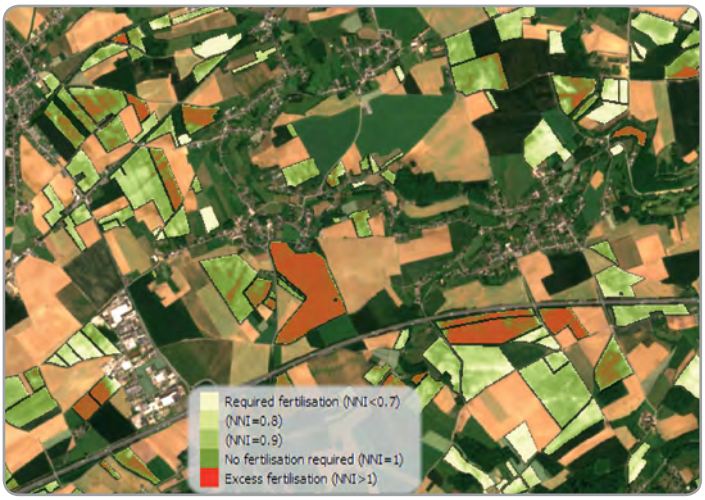
Copernicus Service used: –

Usage Maturity Level: 3/4

the risks of groundwater pollution by nitrates and the subsequent reduction in costs linked to the sanitation of water used for human consumption but also allows a reduction of greenhouse gas emission. Avoiding the spread of more nitrogen than is required allows farmers to reduce the cost of nitrogen fertiliser and subsequently helps them to produce at lower cost in the context of price volatility.

Outlook to the future

The BELCAM platform aims at providing EO-based products and services to regional authorities, farmers and also agricultural extension services (e.g. FIWAP) providing technical and economic support to farmers. The products and services which have been made available concern recommendations on nitrogen, crop status and estimations of yield. Other products/services valorising the sentinels constellations (mainly Sentinel-1 and -2) are currently developed in permanent interaction with end users through the collaborative platform (e.g. dry matter proportion in maize). The BELCAM platform aims at being a non-profit platform meeting a public service role. Reaching this objective is made possible by the Copernicus free and open data policy.



Nitrogen Nutrition index (NNI) describing the crop nitrogen status (in May 2017) of some winter wheat fields in Belgium (source: UCL – Louvain, Belgium).
Credit: Contains modified Copernicus Sentinel data [2017]

> "The BELCAM platform innovates management of fields."
>
> ***Engr. Pierre Lebrun,***
> ***Filière wallonne de la pomme de terre, FIWAP***

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Y. Curnel [1], D. Goffart [1], V. Planchon[1], J.-P. Goffart [1], C. Delloye [2] and P. Defourny[2].
1. CRA-W, Belgium
2. UCL – ELIE, Belgium
Email: y.curnel@cra.wallonie.be

ABOUT COPERNICUS4REGIONS

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