Optical and SAR experiments over the Belgium JECAM site

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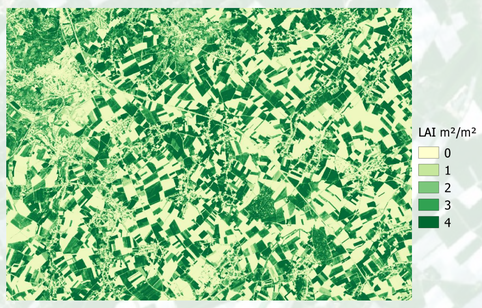
BelCAM project (2014-2018)

The BELCAM research project exploits the new Copernicus satellites for Belgian agriculture stakeholders. With the aim to set up an operational advisory system for local farmers, BELCAM investigates in the estimation of biophysical parameters and modelling of crop growth combining Copernicus' rich EO data with local farm-sourcing.

Participatory platform

Farmers interaction …

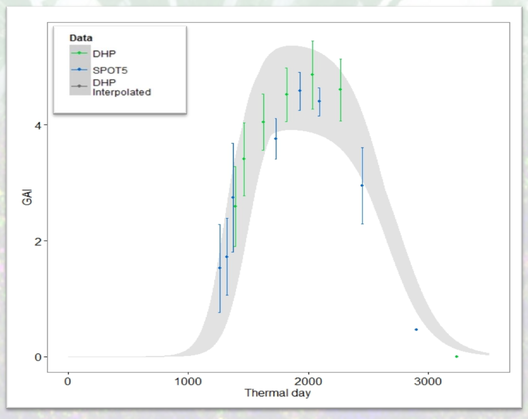
- ← Enter info about their practices (boundaries, soil analysis, farming practices, anomalies)
- → Visualize their parcel state (estimated biophysical parameters, e.g. LAI)
- → Get nitrogen fertilization advise
- ← Can comment for iterative development loop



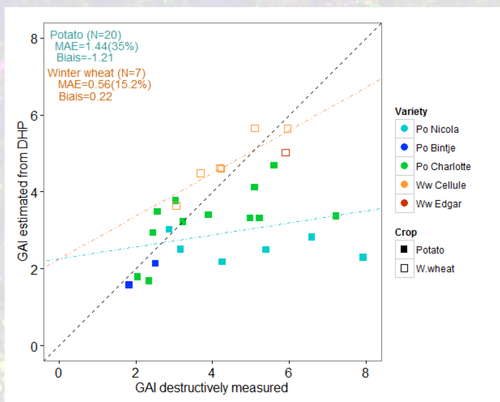
Researchers/Developers investigate in …

- LAI/GAI retrieval with Sentinel-2
- Chlorophyll content (N-content) estimations
- Sentinel-2 composites
- fCover , fAPAR estimations
- Crop growth modelling and yield estimations

GAI estimation



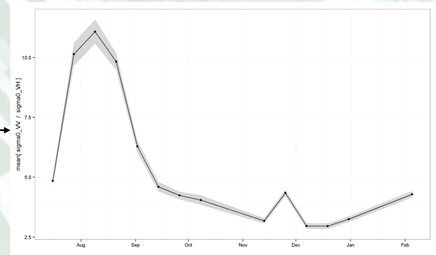
GAI Validation



Monitoring of farming practices (2015-2016)

Nowadays, some farmers in southern Belgium are already innovating in their practices. Some of which have a potential to tackle agriculture sustainability challenges. As an example, some tillage practices tends to increase GHG emissions through an increased mineralization. Monitor innovative farming practices has a key role to play in policies accompanying a sustainable transition. SAR remote sensing measure surface change which influences dielectric and geometric properties without the cloud constraint. Therefore, it has the potential to detect tillage occurrence and cover crop management.

SAR pre-processing → Sentiel-1 toolbox →

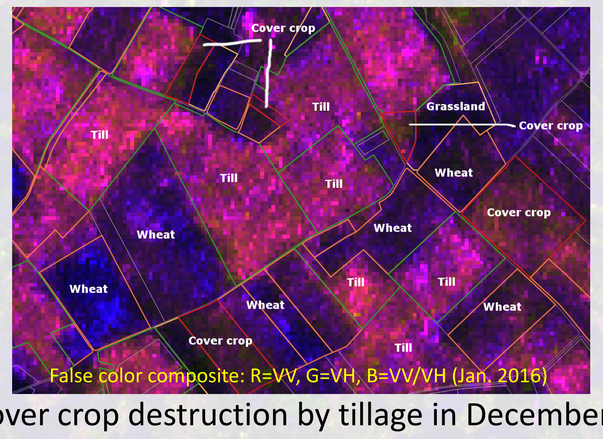


→ SVM Classifications

Cover crop duration

The tillage detection before the cover crop sowing in August reaches a mean overall accuracy of 96%

Tillage Mapping



The cover crop destruction by tillage in December is detected with a mean overall accuracy of 94%

Crop canopy LAI with multiple methods

Multispectral UAV flights

Nitrogen content

Farming practices

Phenology

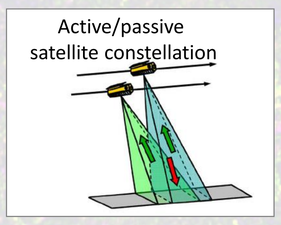
Crop type surveys

Biomass and yield measurements

Growing season events

BelSAR project (2017) in preparation for SAOCOM satellites

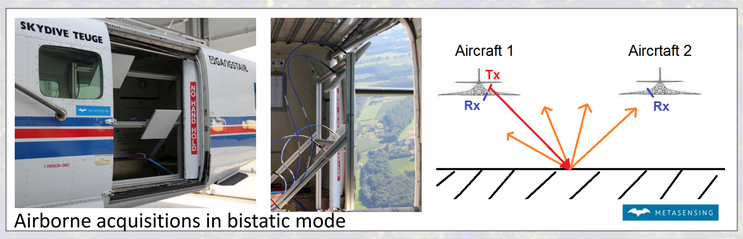
SAOCOM (Satélite Argentino de Observación COn Microondas) & companion satellite



A passive receiving satellite flying in formation with an active satellite is a promising concept in the field of bistatic SAR imagery. In 2018, the Argentine Space Agency will launch SAOCOM-1B, a SAR sensor working in L-band full polarimetric mode. The SAOCOM-CS is a passive companion satellite being build by ESA to fly with SAOCOM-1B.

The BelSAR project in a nutshell

Airborne acquisitions over the Belgian JECAM site to mimic SAOCOM-CS configuration



Airborne acquisitions in bistatic mode

- ➢ Time series of interferometric coherence images
- ➢ Combined with simultaneous field measurements for maize and winter wheat crop

A unique opportunity for the science community to validate the capability of active/passive satellite configuration and to ensure the performances of L-band SAR bi-static imagery for agriculture & soil moisture monitoring