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Crop suitability monitoring for improved yield estimations with 100m PROBA-V data

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This study has been realised within the framework of a PhD targeting to advance agricultural monitoring with improved yield estimations using SPOT VEGETATION remotely sensed data. For the first research question, the aim was to improve dry matter productivity (DMP) for C3 and C4 plants by adding a water stress factor. Additionally, the relation between the actual crop yield and DMP was studied. One of the limitations was the lack of crop specific maps which leads to the second research question on 'crop suitability monitoring'. The objective of this work is to create a methodological approach based on the spectral and temporal characteristics of PROBA-V images and ancillary data such as meteorology, soil and topographic data to improve the estimation of annual crop yields.

The PROBA-V satellite was launched on 6th May 2013, and was designed to bridge the gap in space-borne vegetation measurements between SPOT-VGT (March 1998 – May 2014) and the upcoming Sentinel-3 satellites scheduled for launch in 2015/2016. PROBA -V has products in four spectral bands: BLUE (centred at 0.463 μm), RED (0.655 μm), NIR (0.845 μm), and SWIR (1.600 μm) with a spatial resolution ranging from 1km to 300m. Due to the construction of the sensor, the central camera can provide a 100m data product with a 5 to 8 days revisiting time. Although the 100m data product is still in test phase a methodology for crop suitability monitoring was developed. The multi-spectral composites, NDVI (Normalised Difference Vegetation Index) (NIR_RED/NIR+RED) and NDII (Normalised Difference Infrared Index) (NIR-SWIR/NIR+SWIR) profiles are used in addition to secondary data such as digital elevation data, precipitation, temperature, soil types and administrative boundaries to improve the accuracy of crop yield estimations.

The methodology is evaluated on several FP7 SIGMA test sites for the 2014 – 2015 period. Reference data in the form of vector GIS with boundaries and cover type of agricultural fields are available through the SIGMA site partners.

References
http://proba-v.vgt.vito.be/
http://www.geoglam-sigma.info/