Geophysical Research Abstracts
Vol. 21, EGU2019-18620, 2019
EGU General Assembly 2019

Monitoring rapeseed flowering by integrating data from Sentinels, street-level imagery, and Twitter

Matthieu Taymans, Raphaël d'Andrimont, Sebastian Brackhane, Guido Lemoine, and Marijn van der Velde

Early spring each year, the bright yellow flowers of rapeseed appear across the European landscape. The striking yellow of the rapeseed flowers provides an excellent opportunity to develop and test methods that rely on combining data from various sources to monitor the spatio-temporal flowering patterns. The potential yield of rapeseed strongly depends on conditions during flowering as the number of flowers influences pod formation and the number of seeds. Better insight on flowering time can thus improve yield forecasts. Satellite observations from Sentinel-1 & 2 are utilized, along with expert and crowd-sourced collected street-level imagery, and phenological observations following the BBCH-scale. In addition, a dedicated Twitter #YellowFlowersEU social media campaign was set up to collect pictures and locations of flowering rapeseed. Integrating such novel data sources with high-resolution satellite data with short revisit cycles, can transform crop monitoring.

The data was collected in spring 2018 during the flowering period, which lasts for about 3 to 4 weeks in any location. For two months, a total of six dedicated one-day surveys were carried out along road transects in Southern and Northern Germany. High quality close-up photographs and detailed observations on flowering stages were made in more than 200 fixed field locations. Additionally, more than 200.000 street-level images were collected along all transects with side-looking cameras attached to the roof of a car, hence covering at least 2000 rapeseed fields. More than 1000 Tweets were sent using the #YellowFlowersEU hashtag.

Due to exceptionally clear weather conditions, a large selection of suitable Sentinel-2 imagery is available for the analysis. A computer vision algorithm trained on the field photographs was used to determine the BBCH flowering stages on the street-level images. These in turn were used as ground-truth for the Sentinel based parcel level analysis. We highlight the opportunities such data integration can bring for large scale crop phenology monitoring and compare our results to the observation network of the DWD (Deutscher Wetterdienst). Finally, we discuss ways to link the derived parcel level flowering parameters with weather data to predict potential fluctuations in rapeseed yield.