



Crop yield assessment using sentinel satellite imagery and crop modelling methods

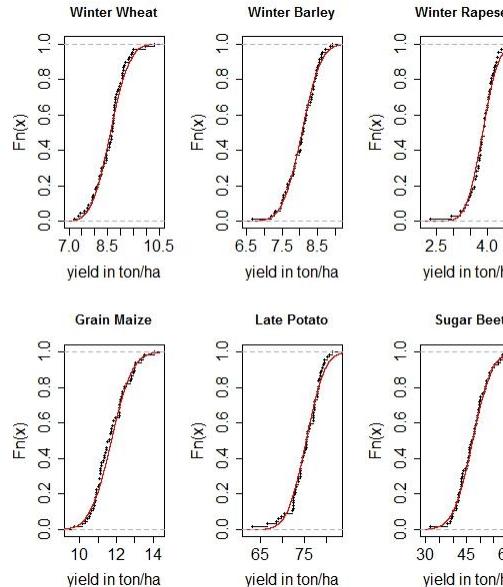
Anne Gobin



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yield variability and weather extremes



Link between extreme meteorological events
and low yields

Low yields are mostly linked
to waterlogging and storms

Low yields are mostly linked
to drought & heat stress



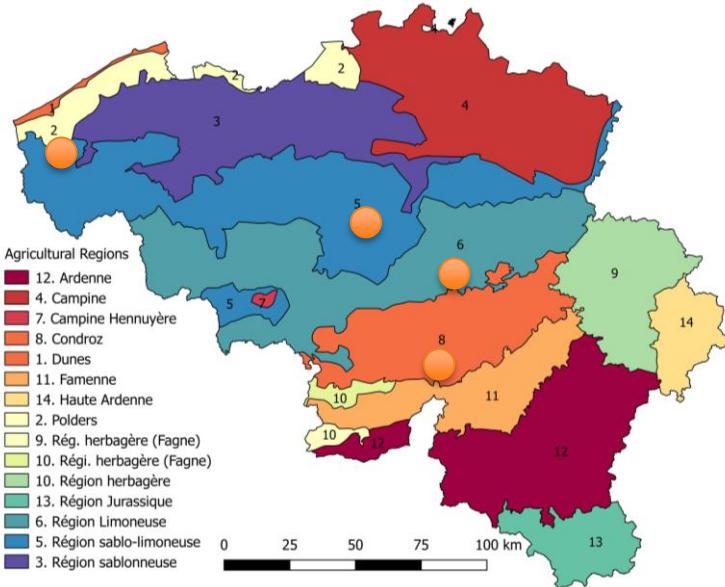
Impact of extremes: Winter wheat yield in Belgium

EXTREMES

CROP MODEL

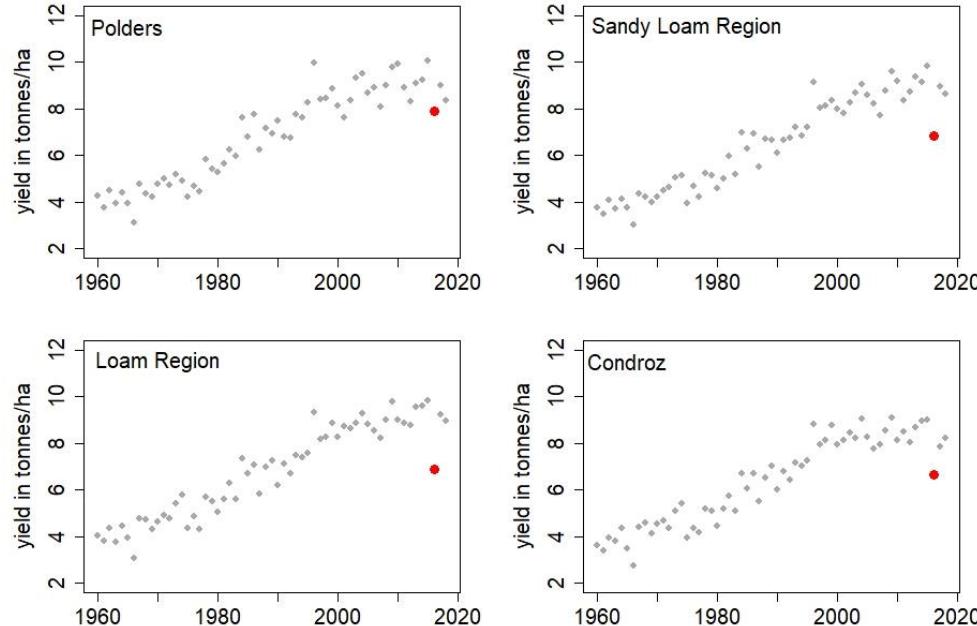
DATA FUSION

CONCLUSION



Major production regions:

Polders, Sandy-loam region; Loam belt; Condroz





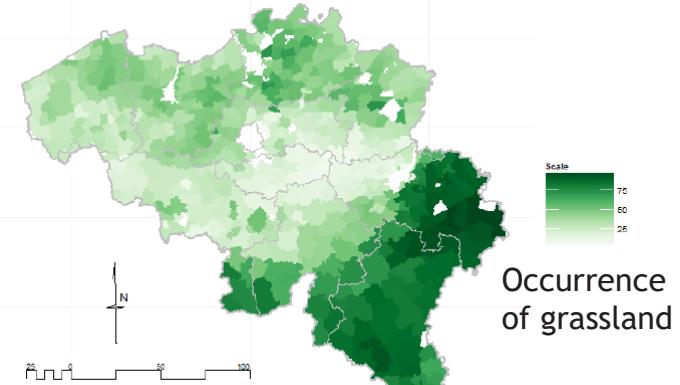
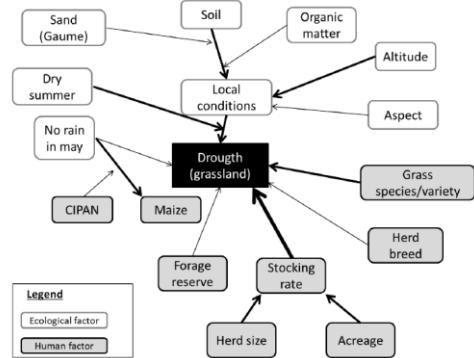
Vulnerability to extremes: Drought impact on grassland

EXTREMES

CROP MODEL

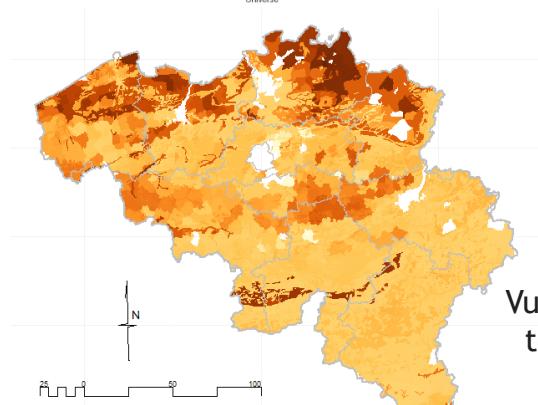
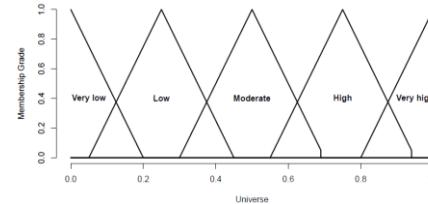
DATA FUSION

CONCLUSION



Occurrence
of grassland

- (Cognitive) map of vulnerability factors
- Vulnerability map: Fuzzy Inference systems + GIS in R
 - membership functions
 - Rules to combine membership data

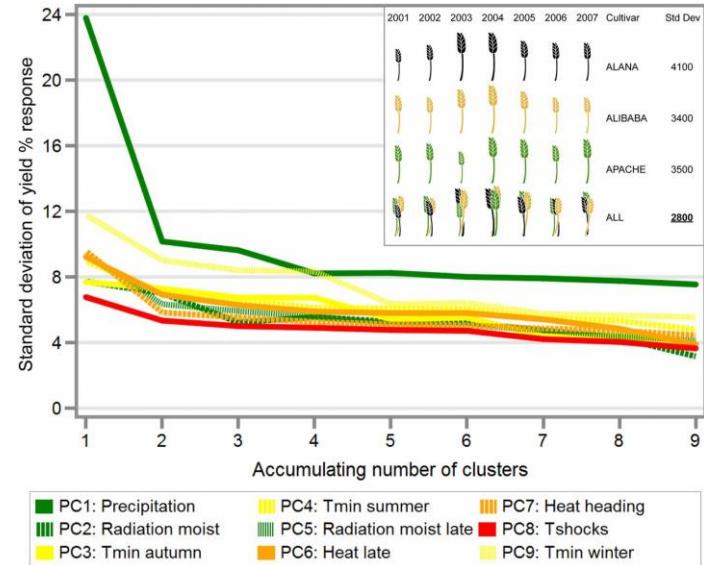


Vulnerability
to drought





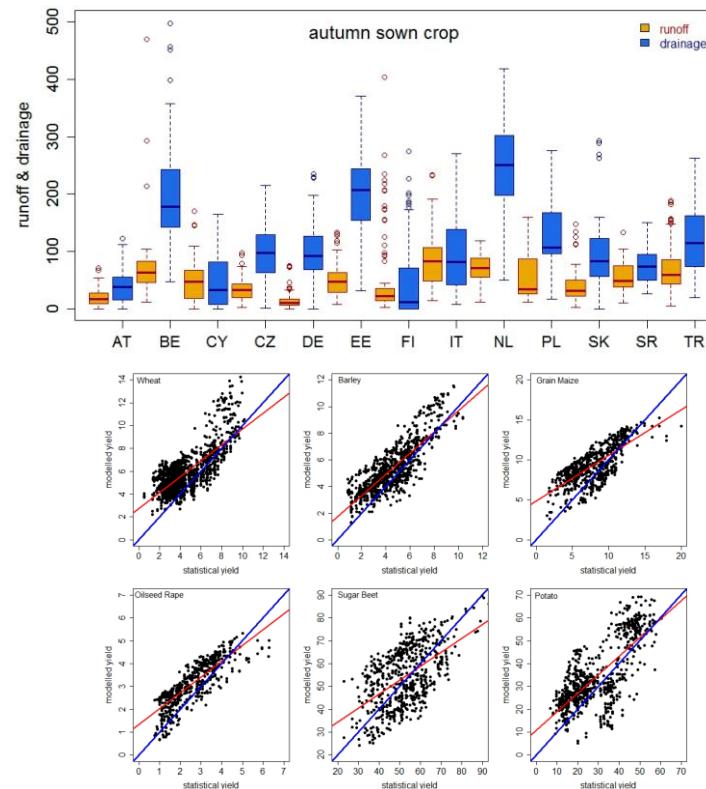
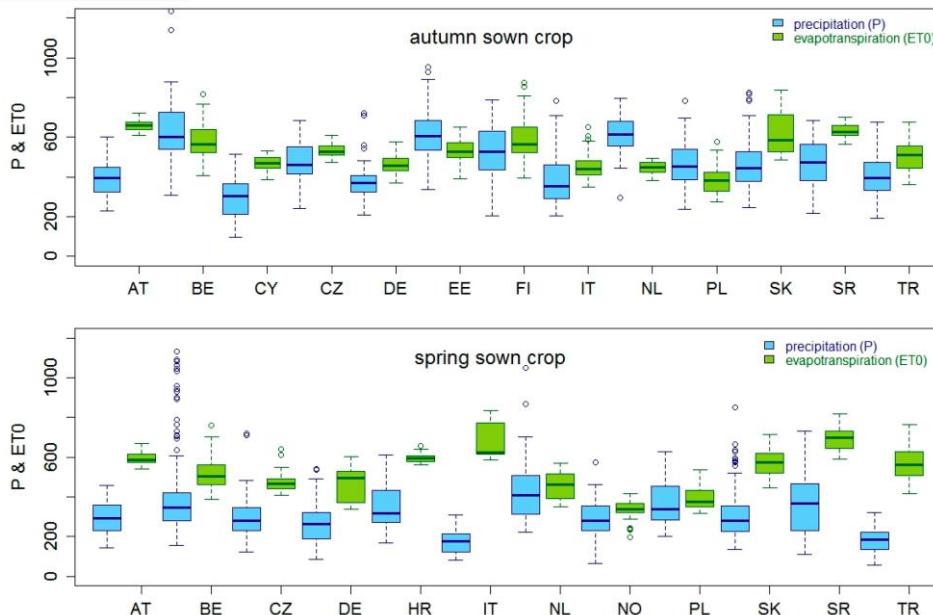
Resilience to extremes: Wheat yield and climate resilience



Agricultural yield ~ weather conditions, but resilience ? **Current wheat varieties may be at risk**



Meteorological & soil data => crop yield



Gobin, A., Kersebaum K.C., Eitzinger J., Trnka M., Hlavinka P., ..., Zoumides C., 2017. Variability in the water footprint of arable crop production across European regions. Water 2017, 9(2), 93; <https://doi.org/10.3390/w9020093>

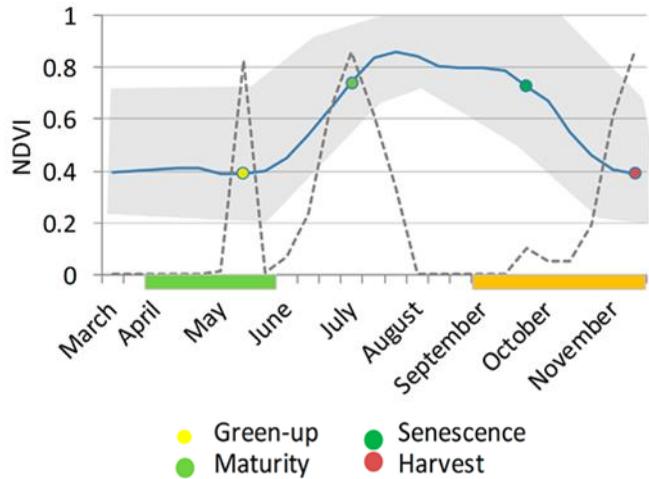




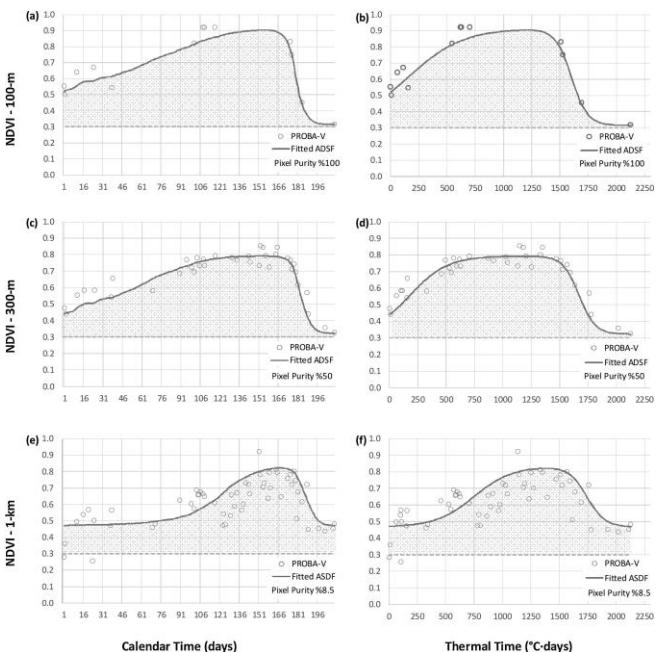
Crop Performance & satellite imagery

a

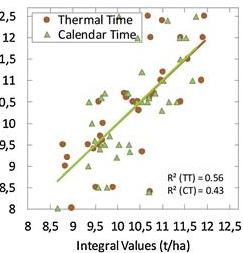
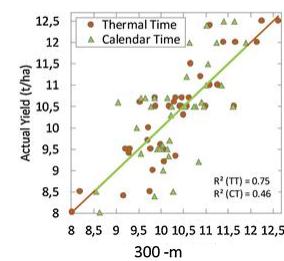
Flanders-Belgium - Grain maize



Winter wheat in N-France

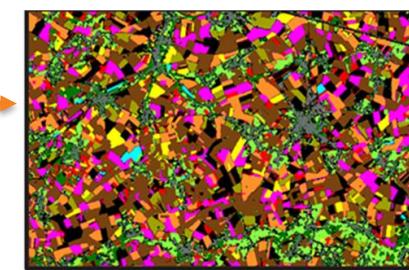
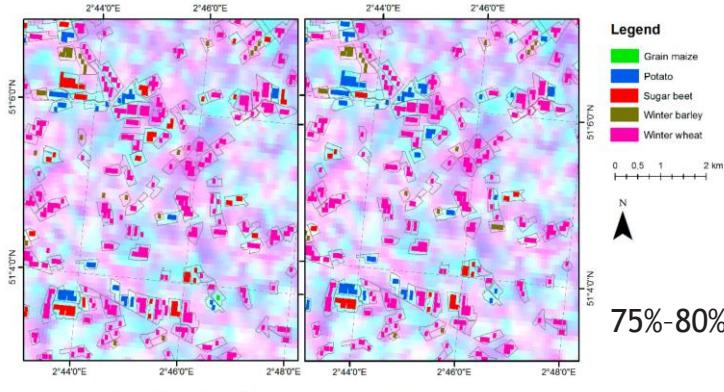
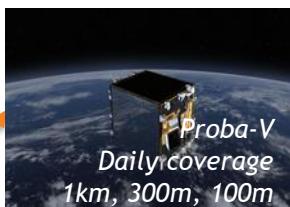
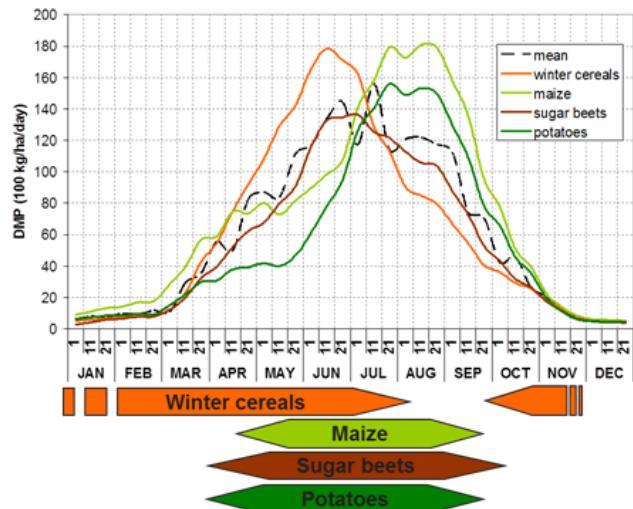


100-m





Data fusion: crop area & production



85%-95%

Durgun, Y.Ö., Gobin, A., Vandekerchove, R., Tychon, B., 2016. Crop Area Mapping using 100m PROBA-V time series. *Remote Sensing* 8(7), 585 <https://doi.org/10.3390/rs08070585>

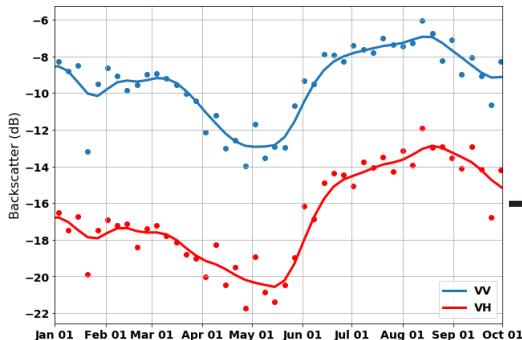
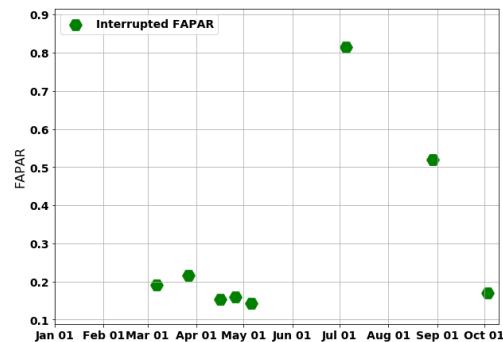
Van Tricht, K., Gobin, A., Gilliams, S., Piccard, I., 2018. Synergistic use of Sentinel-1 radar and Sentinel-2 optical imagery for mapping crops at large scale: a case study for Belgium. *Remote Sensing* 2018, 10, 1642; <https://doi.org/10.3390/rs10101642>



Data fusion: crop development at the field scale

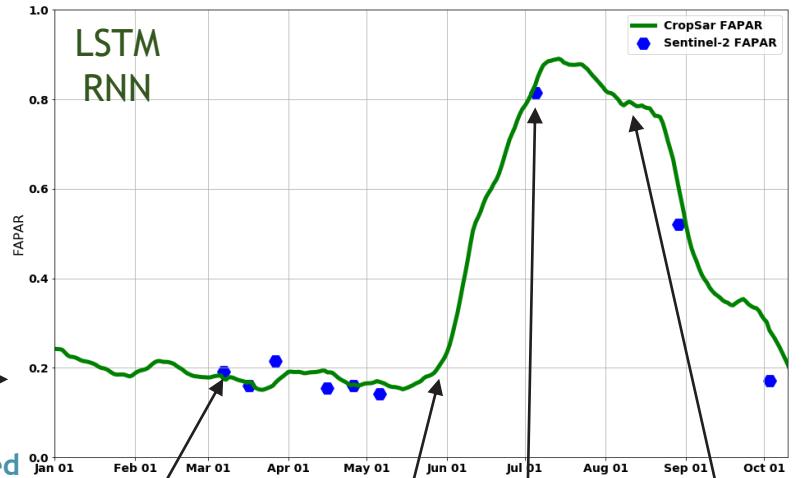


Sentinel 2



Sentinel-2
interrupted

Sentinel-1
uninterrupted



No satellite
image



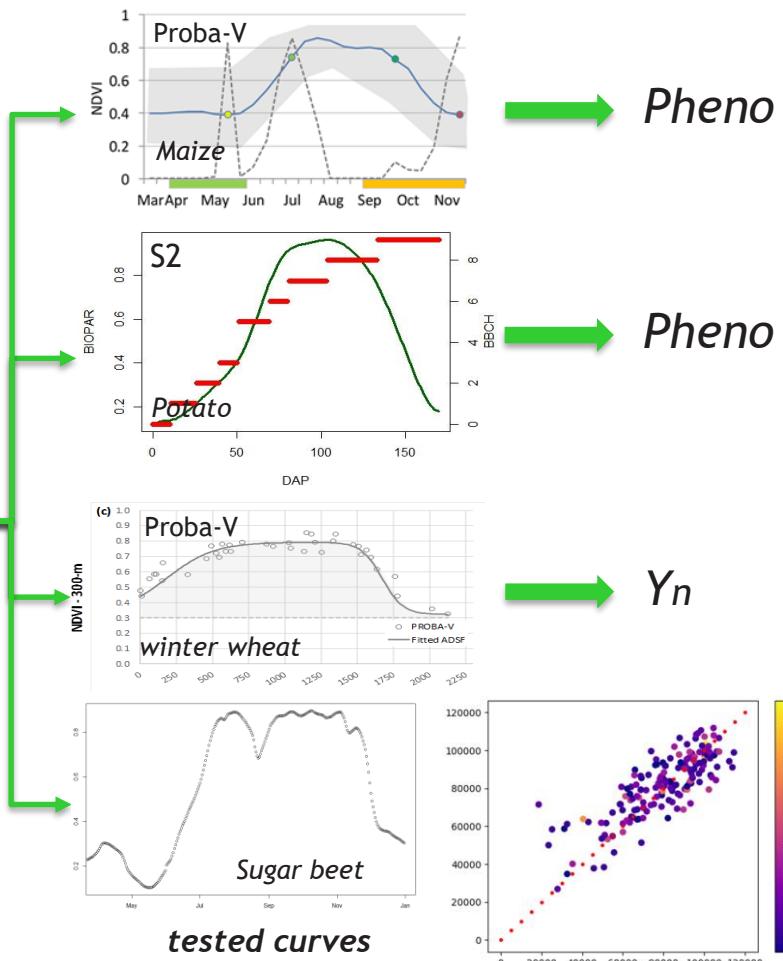
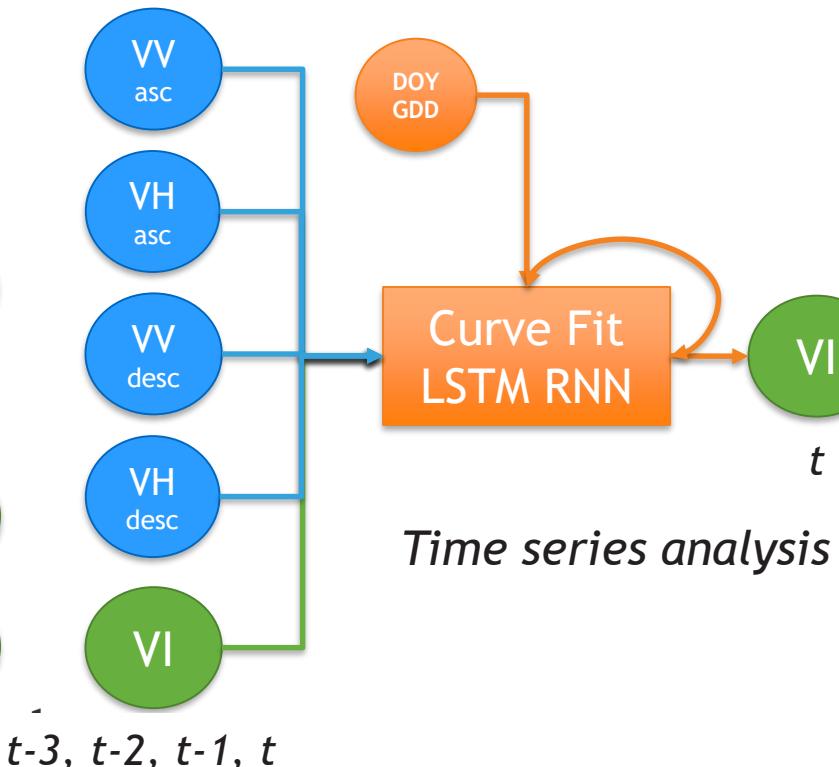
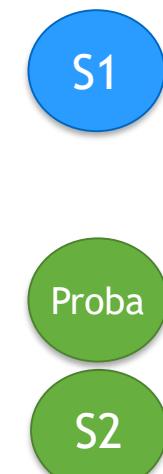
No satellite
image
remotesensing.vito.be



Sentinel 1



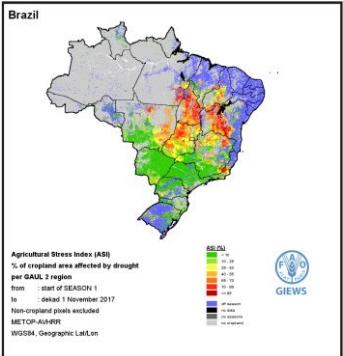
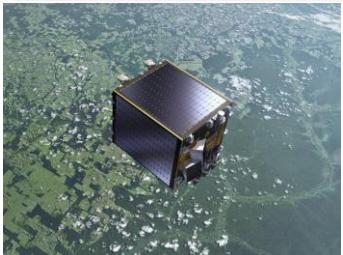
Data fusion: Crop yield assessment



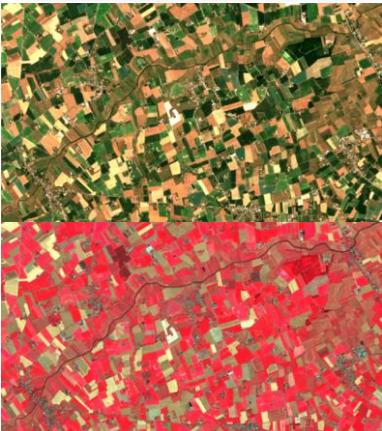
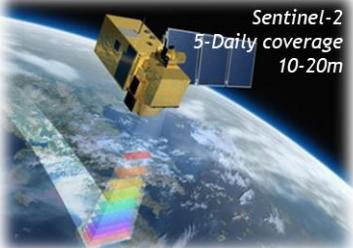


Promising data fusion & modelling methods for crop yield assessment in a changing climate

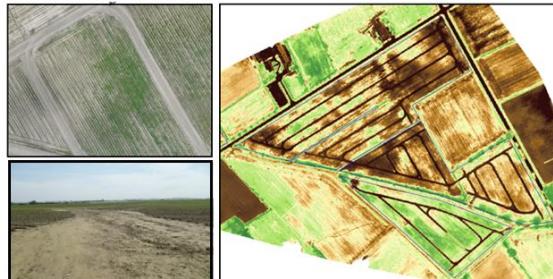
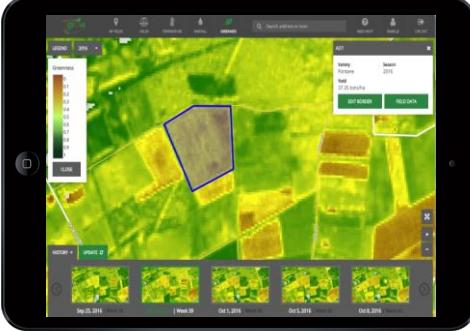
Global



Regional



Field



Plot





THANK YOU!

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