

## BELHARMONY: HARMONIZATION OF MULTI-MISSION HIGH RESOLUTION TIME SERIES: APPLICATION TO BELAIR.

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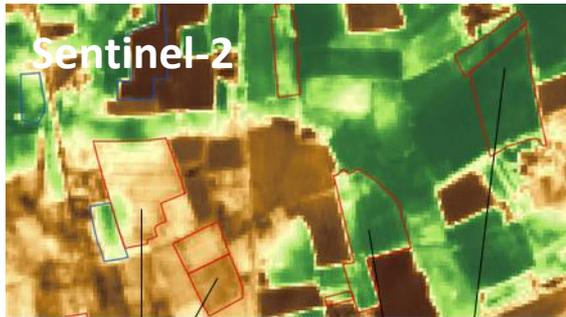
BEOday 30 January 2018



**vito**

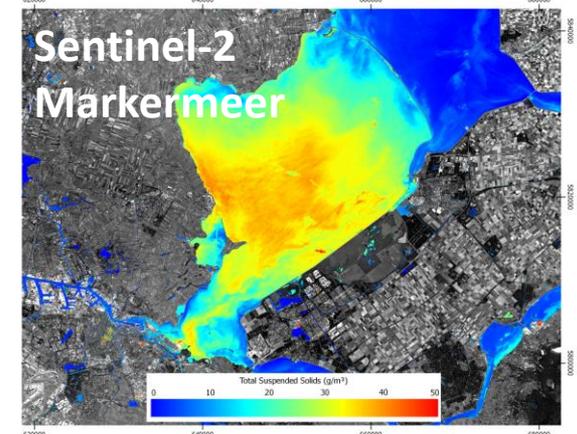
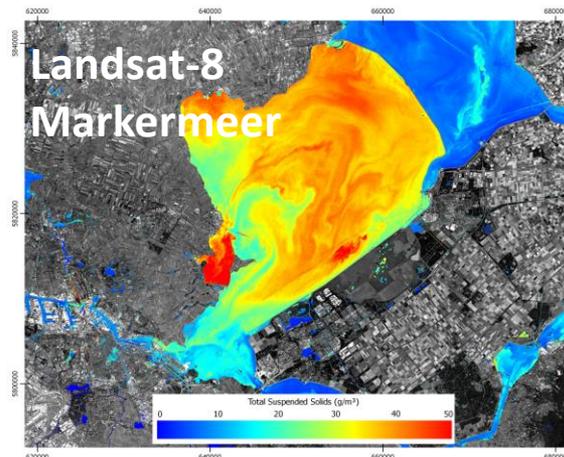
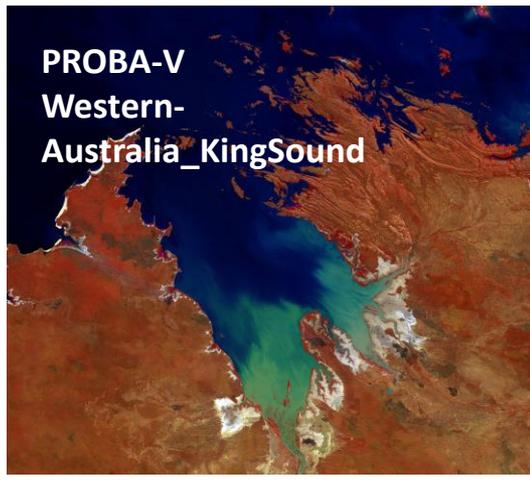
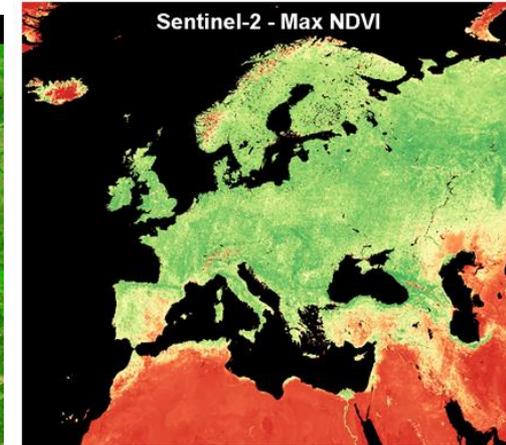
# BELHARMONY CONTEXT

*A clear tendency in the use of higher spatial and temporal resolution*

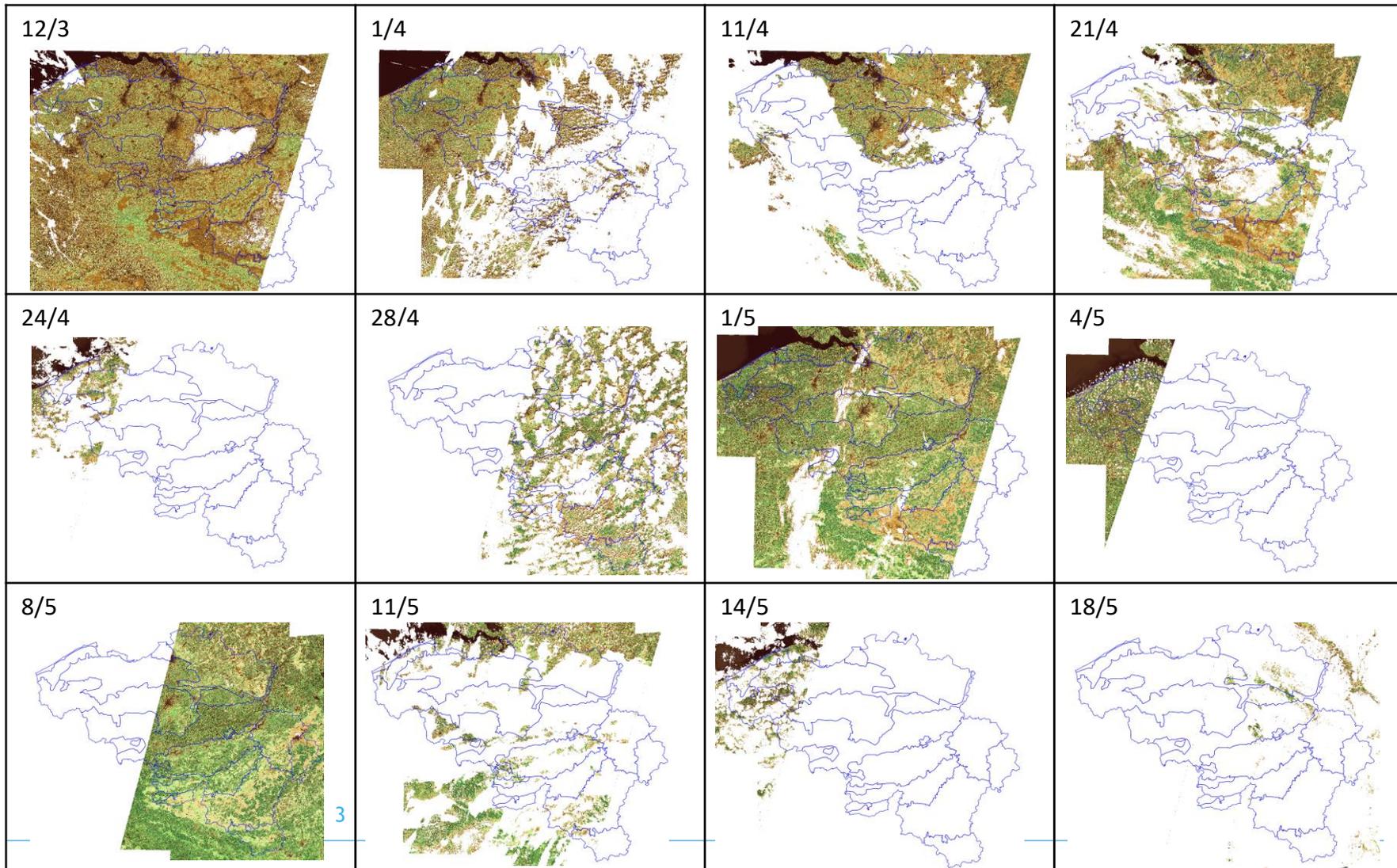


*More advanced senescence*

*Still green*



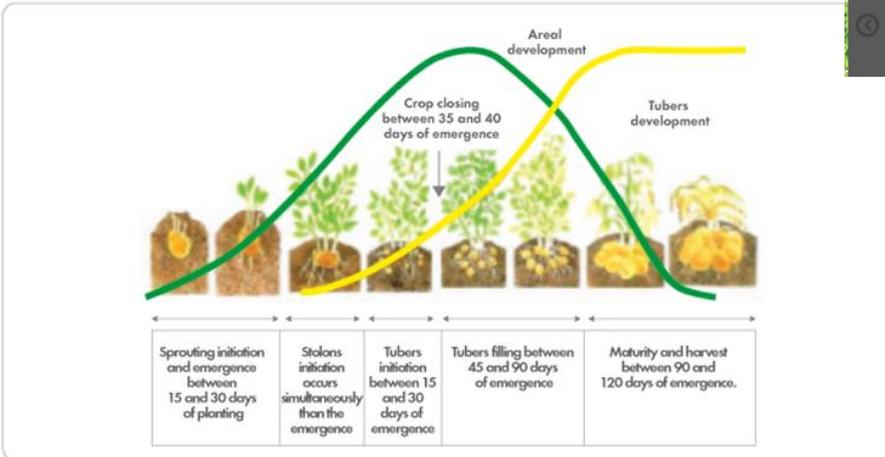
# BELHARMONY CONTEXT



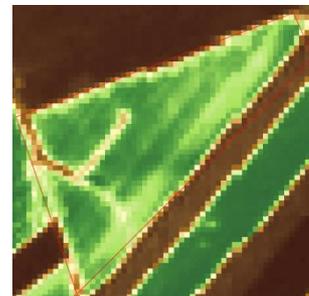
# BELHARMONY CONTEXT

For time series and operational service data from different missions to be combined !

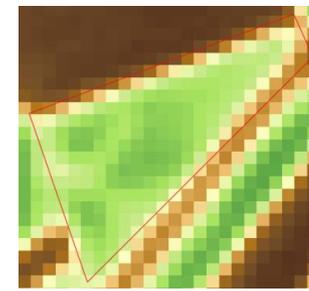
Eg. Sentinel-2 combined with DMC/Deimos-1



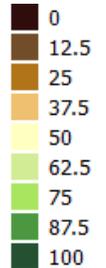
Sentinel-2



Deimos-1

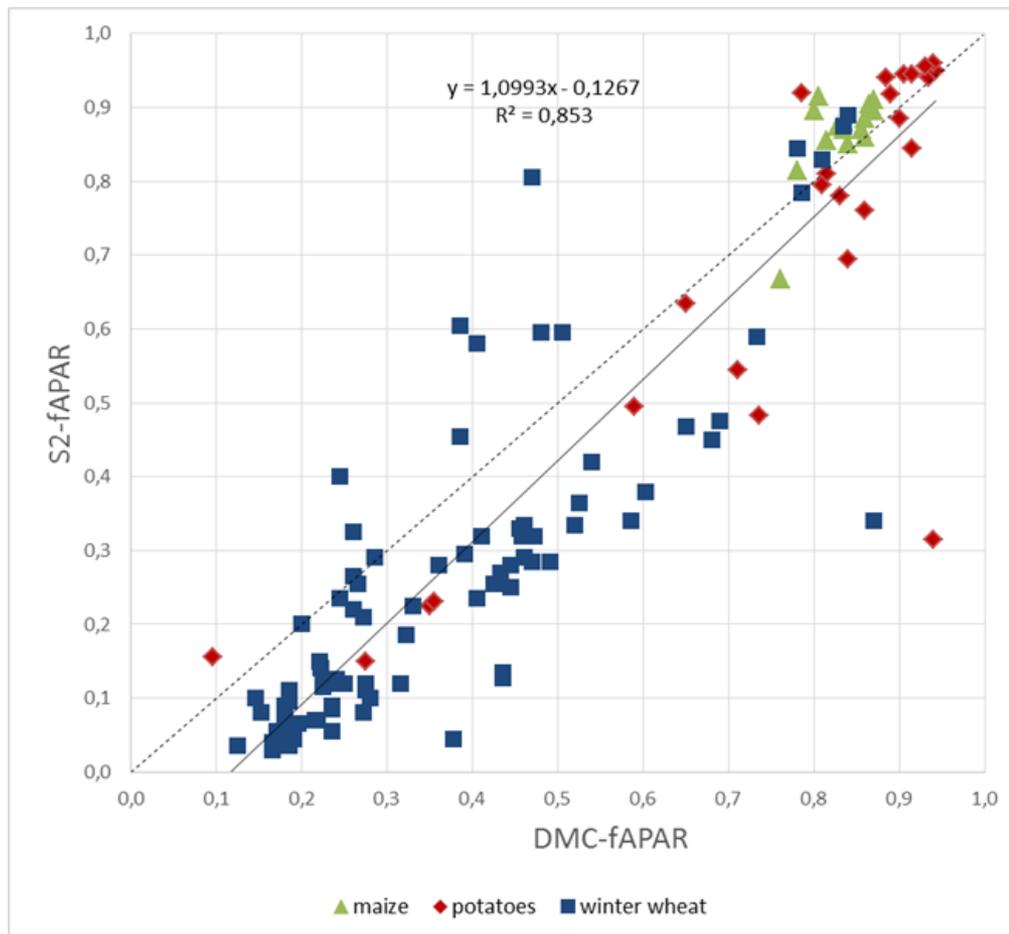


Greenness index



# BELHARMONY CONTEXT

*Data consistency concern !*



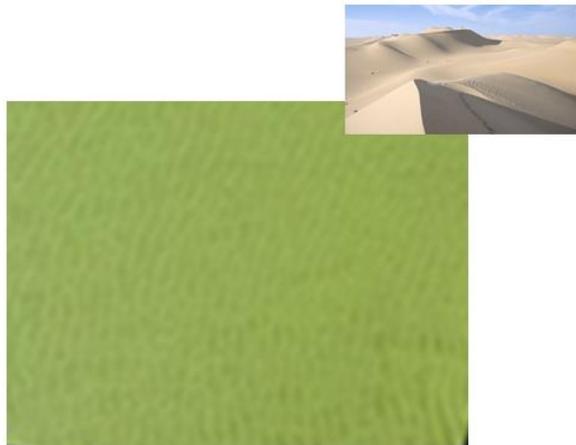
## BELHARMONY OVERALL OBJECTIVE

- To assess and improve the consistency of multi-sensor high resolution time series. (HARMONY)
- Focus on Landsat-8, Sentinel-2, PROBA-V (central camera) and Deimos-1/DMC
- How ?
  - Bottom-up approach (from L1 to L2 to L3)
- Why ?
  - Overall applicability
  - To identify cause of biases
  - Errors amplified from L1 (TOA reflectance) to L2 (BOA reflectance)

1. Does there exist a bias in the L1 data ?

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Inter-comparison over the Libya-4  
PICS desert site following the  
OSCAR\* desert approach



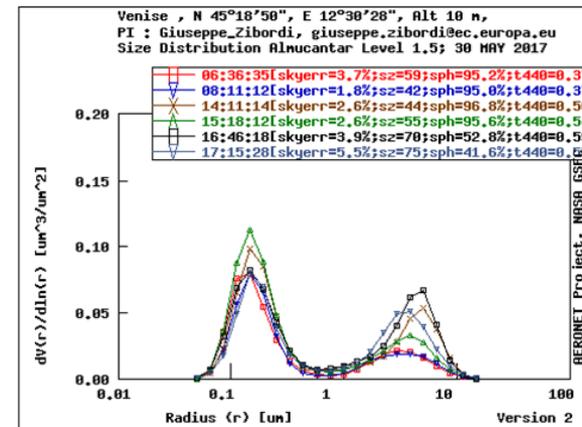
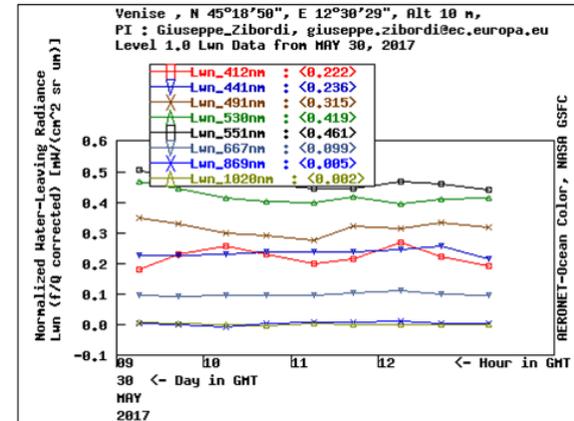
Bias Assessment over instrument  
RadCalNet sites (Land Equipped Sites (LIS))



\*OSCAR (Optical Sensor Calibration with simulated Radiances). Govaerts, Y., S. Sterckx, and S. Adriaensen (2013). Use of simulated reflectances over bright desert target as an absolute calibration reference. Remote Sensing Letters, , Vol. 4: 6, 523-531.

## 1. Does there exist a bias in the L1 data ?

Bias Assessment over AERONET-OC sites

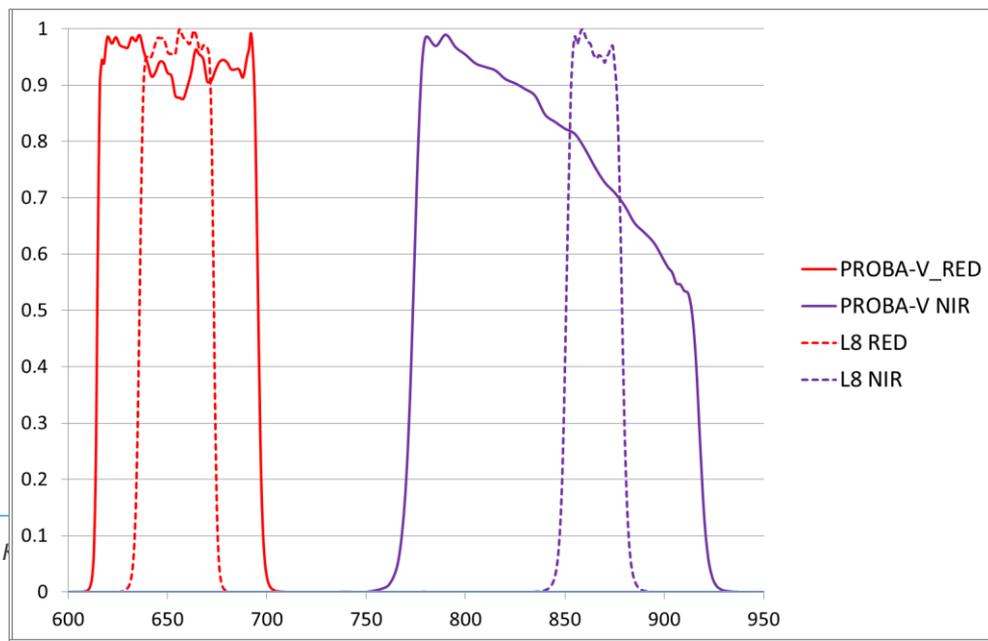


### 1. Does there exist a bias in the L1 data ?

- Is this bias scene brightness dependent ?
- Can we determine gains for inter-calibration of the L1 data ?

### 2. What is the impact of intrinsic differences in the RSRF of the different sensors ?

- Can BELHARMONY through the introduction of band or index dependent spectral adjustment functions correct for this ?

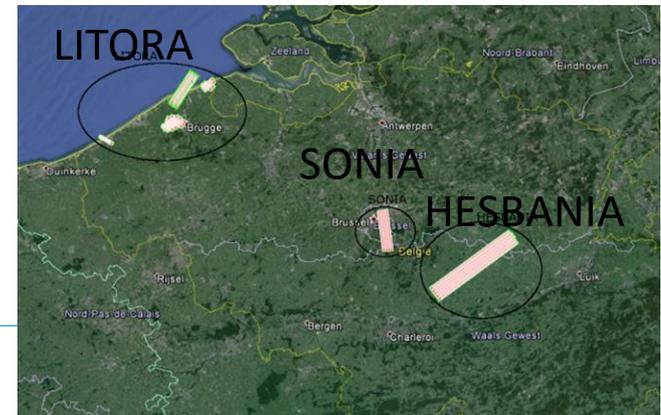


1. Does there exist a bias in the L1 data ?
2. What is the impact of intrinsic differences in the RSRF of the different sensors ?
3. Can biases in L2 and L3 data be reduced through the use of a common processing chain ?

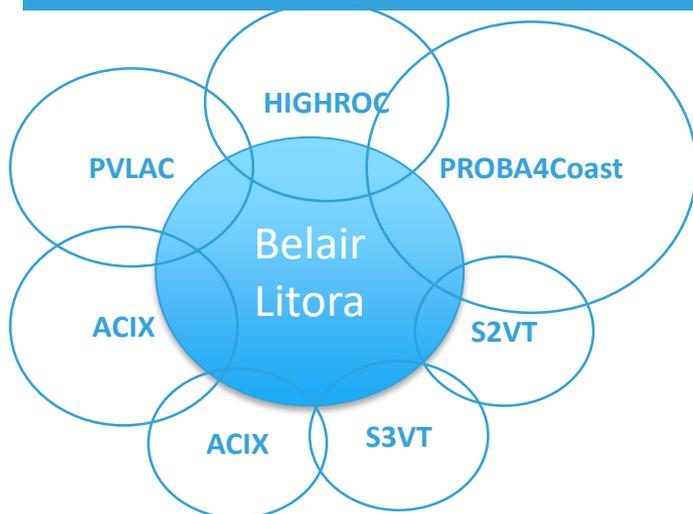


1. Does there exist a bias in the L1 data ?
2. What is the impact of intrinsic differences in the RSRF of the different sensors ?
3. Can biases in L2 and L3 data be reduced through the use of a common processing chain ?
4. What is impact of all these harmonization measures on the consistency of the multi-sensor L2/L3 time series?

=> BELHARMONY APPROACH:  
BELAIR CASE STUDIES



## LITORA CASE STUDY



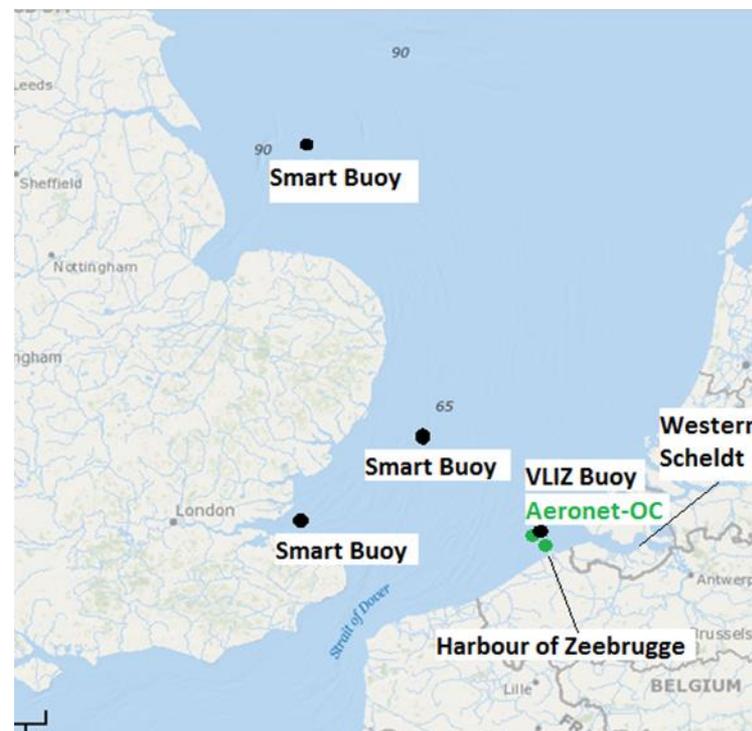
### Consistency evaluation of L2

#### Aeronet-OC: Rw

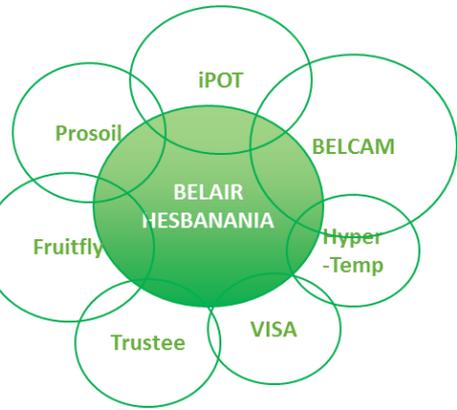
- in near shore turbid waters (Zeebrugge MOW1 site)
- further offshore in clearer waters (Thornton site)

### Consistency evaluation of L3 (Turbidity)

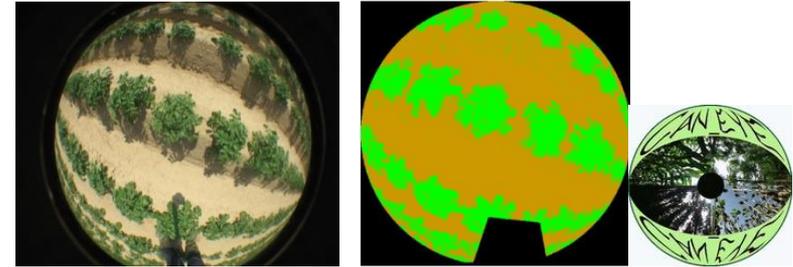
- Turbidity from **CEFAS SmartBuoys**, **VLIZ Buoy**, **Dedicated sampling**



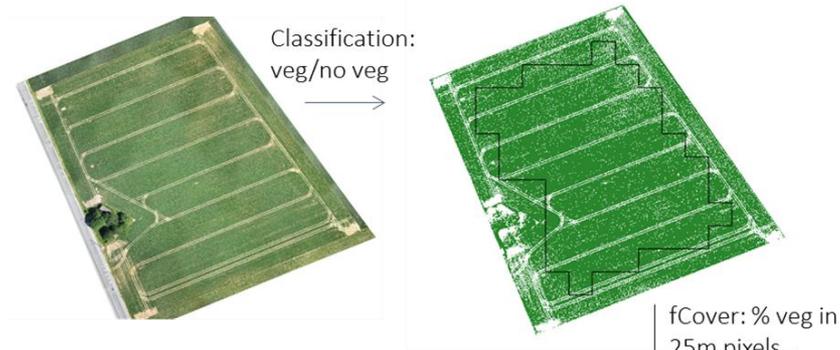
# HESBANIA CASE STUDIE



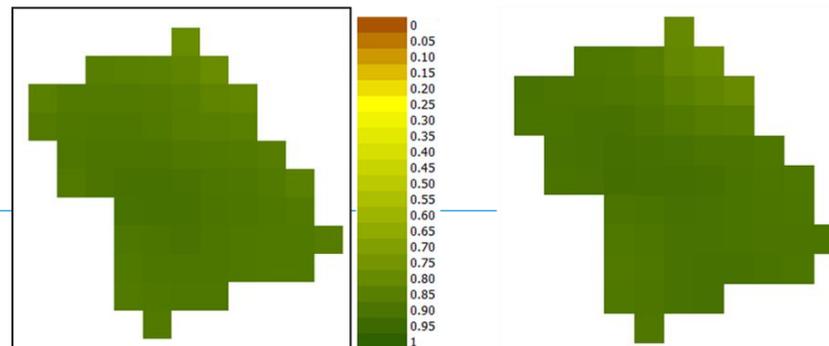
## Hemispherical photographs (LAI, fCover, fAPAR)



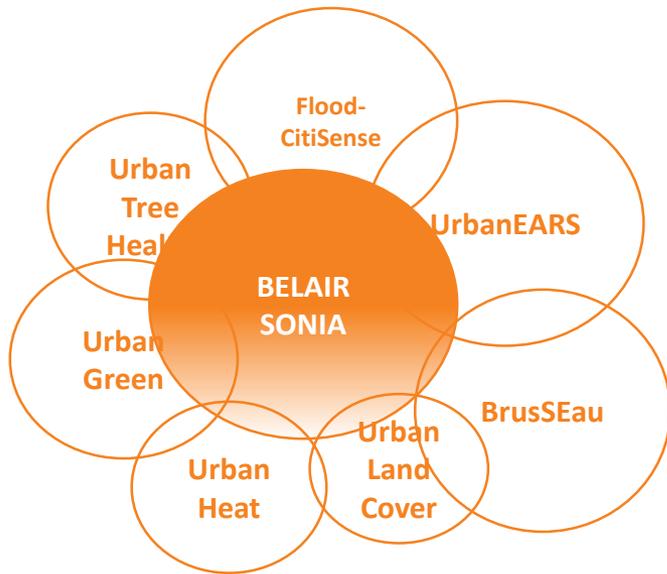
## UAV images (fCover)



Example: Fontane, 1/7/2015



# SONIA CASE STUDY



**Spatiotemporal characterization and monitoring of water and energy fluxes in URBAN and FOREST environment**

## Hydrological ground truthing

**TOP SOIL CHARACTER**  
 - TYPE  
 - MOISTURE  
 - TEMP (°C)

**SURFACE T°**  
 - GRASS  
 - URBAN

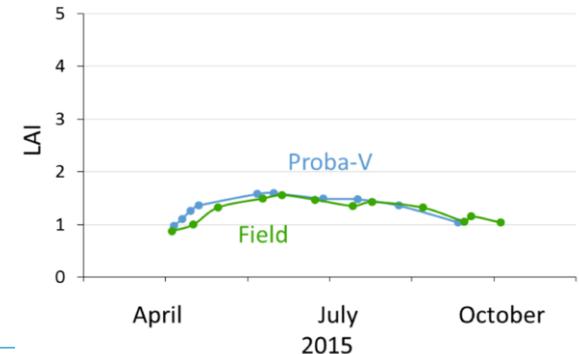


**METEO PARAMETERS**

**MAPPING TREE DYNAMICS**

**SPECTRAL CHARACTER (WET/DRY)**  
 - GRASS  
 - URBAN

## Tree dynamics > Leaf Area Index (LAI) In-situ vs Proba-V



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# Thank you!

