Sentinel-2 BOA BRF inter-comparison and biophysical parameter retrieval

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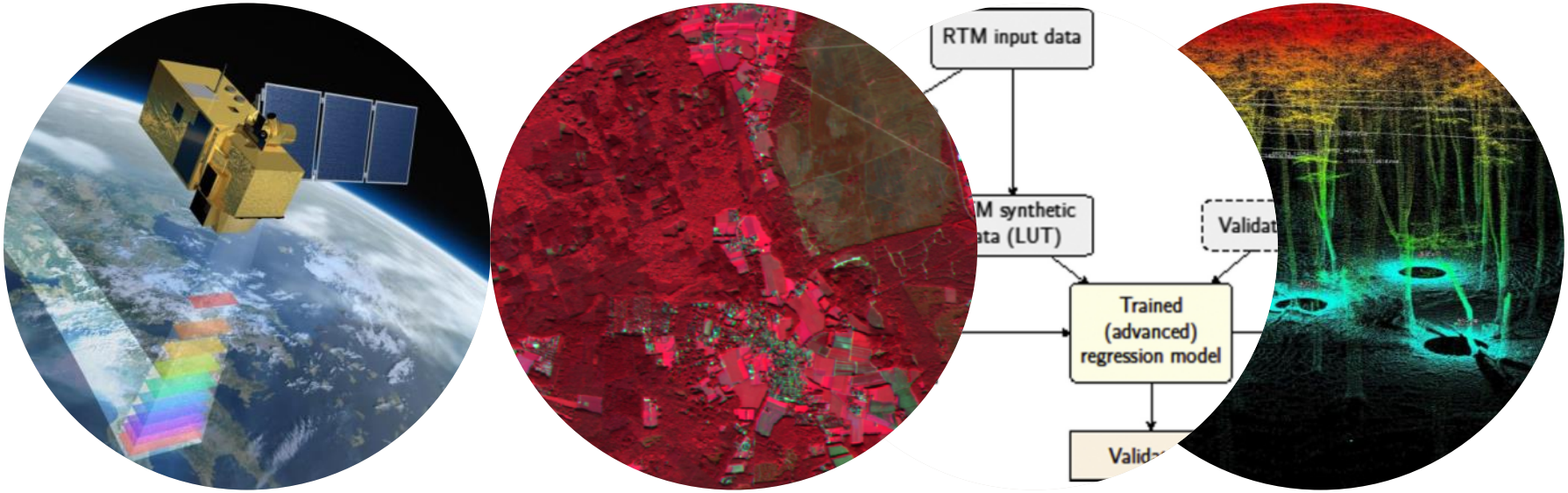

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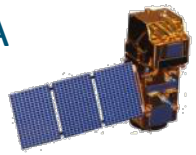
Overview

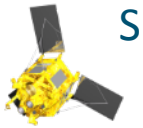
1. Speulderbos Cal/Val site, The Netherlands
2. BOA RF Inter-Comparison
3. Monitoring Canopy Phenology
4. Biophysical Parameter Retrieval

1. Speulderbos – Concept & Activities

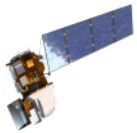
Sentinel-2A



SPOT 6/7



Landsat 7/8



UK-DMC-2/
Deimos-1

HYMSY

ALS: RIEGL
RiCopter

Leaf sampling:
ASD Fieldspec
Minolta SPAD

Littertraps
(true LAI)

TLS: RIEGL
VZ-400

PASTIS 57

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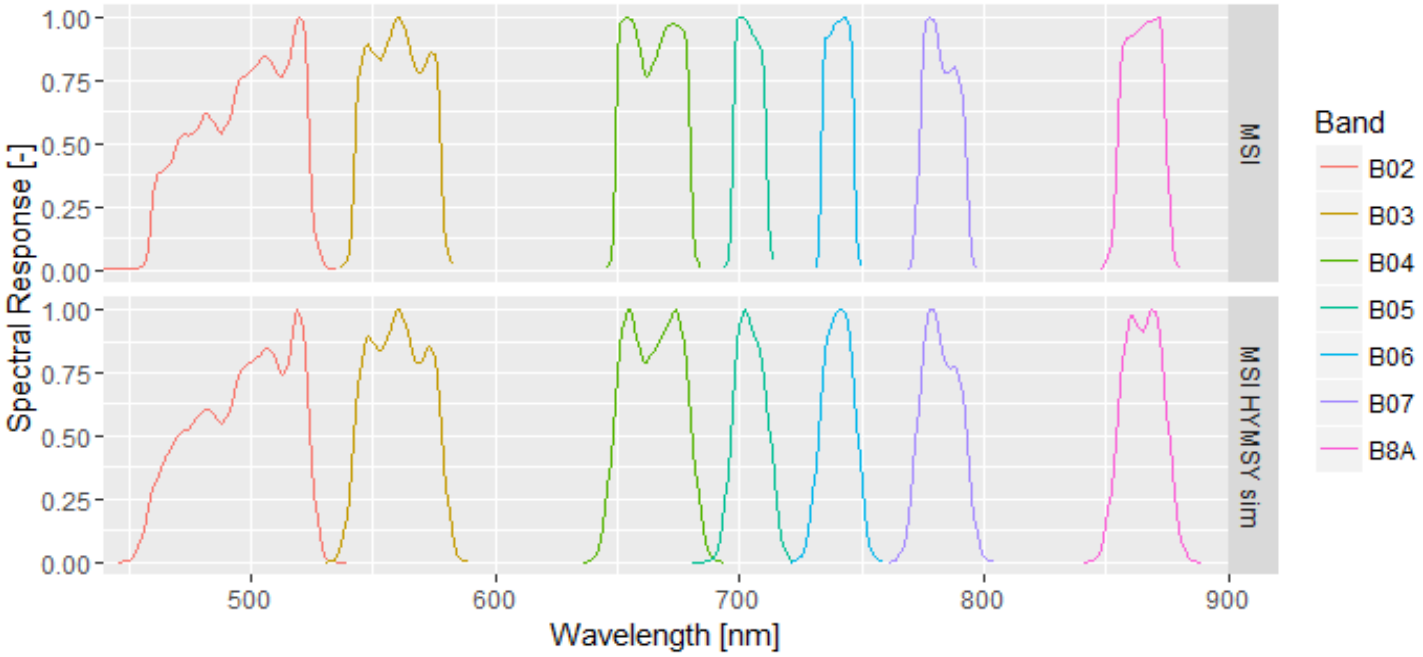
2. BOA RF Inter-Comparison

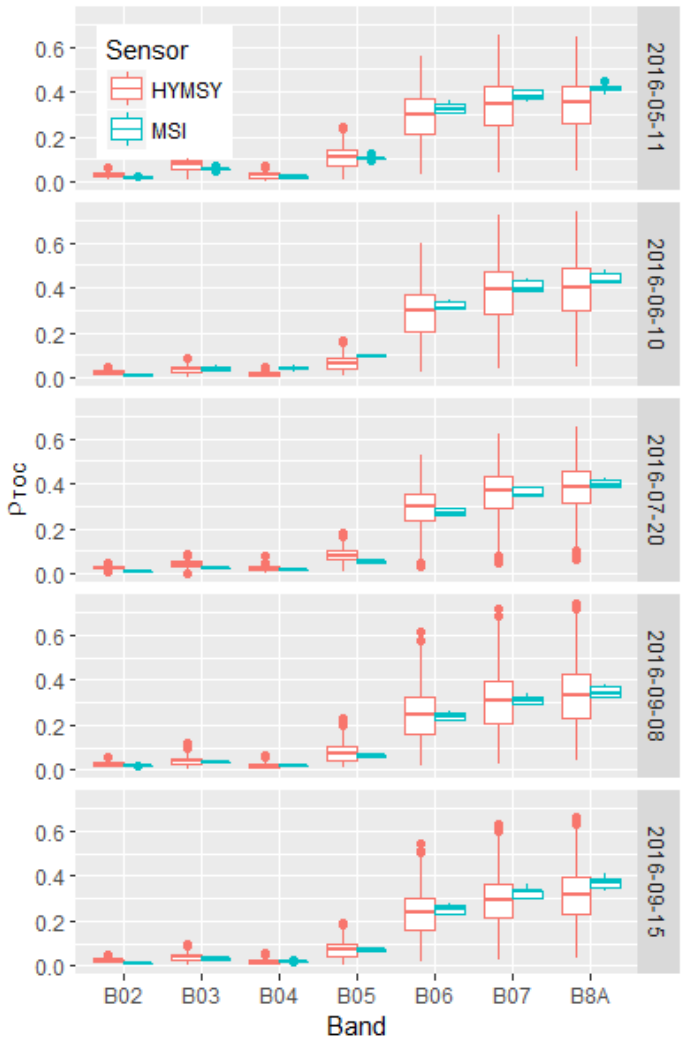
HYMSY: 400 – 950 nm, 101 bands à 9 nm (FWHM)

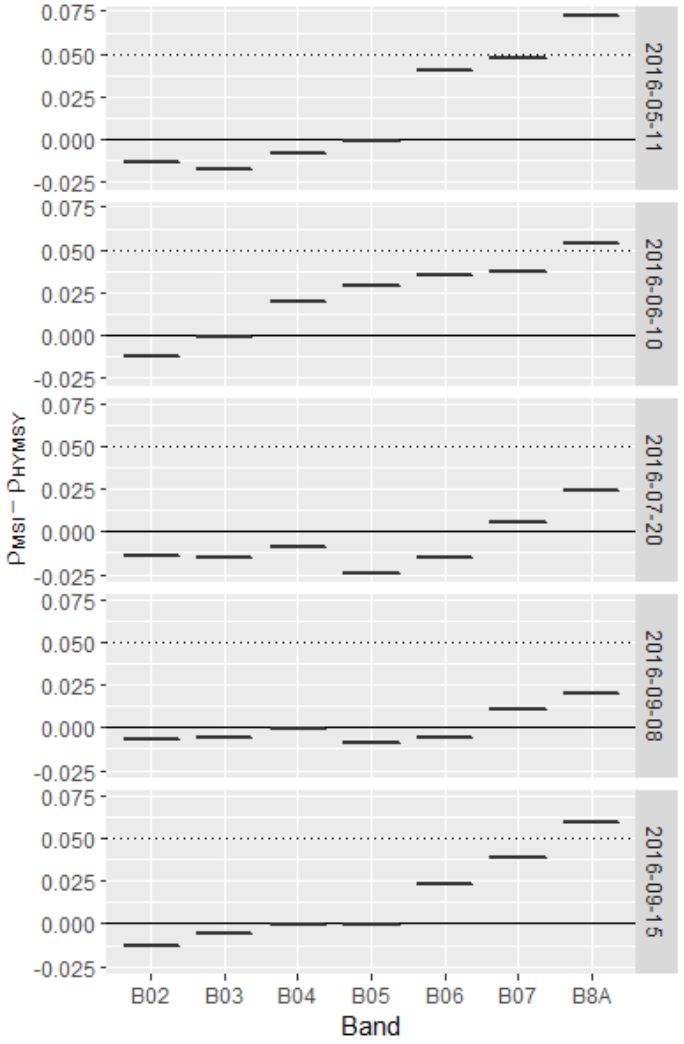
Spectral simulation of MSI VIS/NIR



Suomalainen, J., et al. (2014). A Lightweight Hyperspectral Mapping System and Photogram-metric Processing Chain for Unmanned Aerial Vehicles. *Remote Sensing*, *6*(11).

2. BOA RF Inter-Comparison





UAV flight times

09:20 UTC

08:40 UTC

10:35 UTC

09:35 UTC

10:50 UTC

S2A overpass:
~10:45 UTC

2. BOA RF Inter-Comparison

HYMSY for inter-comparison:

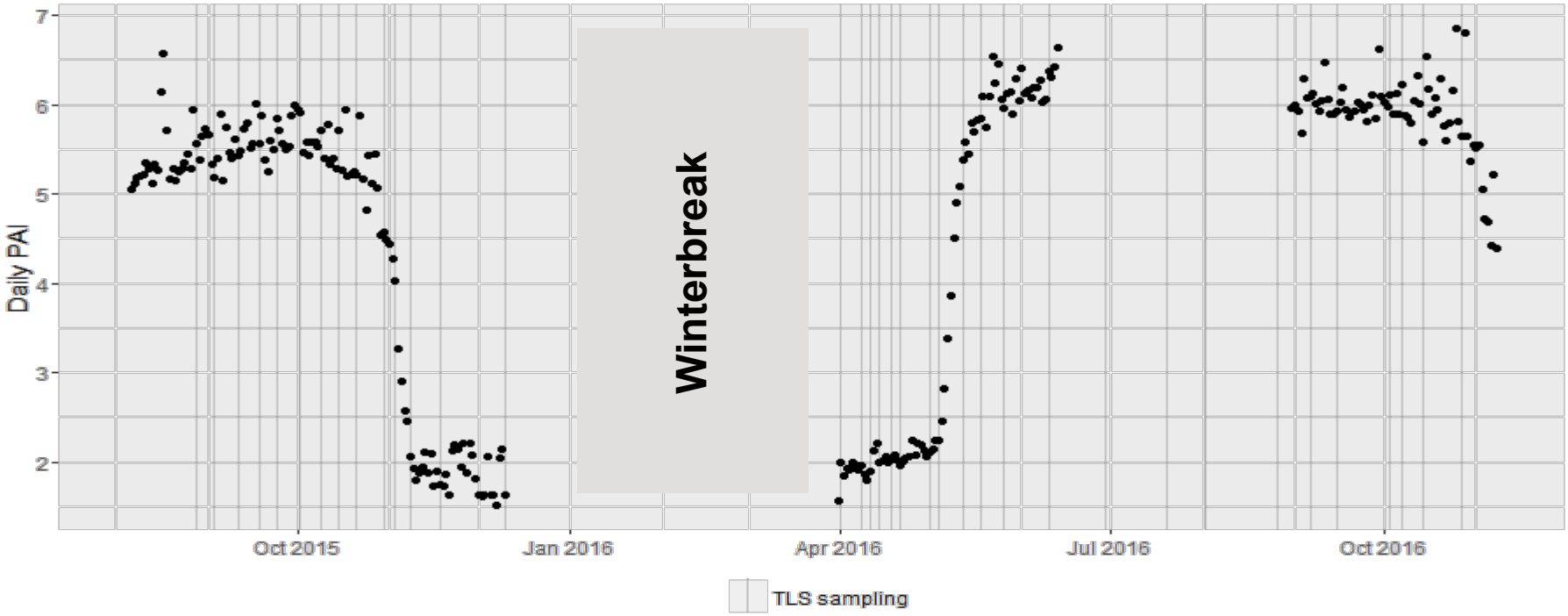
- Radiometric accuracy ~5-10% (?)
- Mapping capacity: 3.5 ha (~100 pixels @ 20 m resolution)

Advantages	**Disadvantages**
Mobile + flexible in planning > Sampling concurrent with overpass	Legal barriers (Visual Line of Sight, distance to buildings etc.)
Low material cost (~300 EUR / flight)	Restricted by weather (wind > 7 m/s)
Repeatable > time series	

3. Monitoring Canopy Phenology

- PASTIS57
- high frequency

Lecerf et al., (2010). PASTIS 57: Autonomous light sensors for PAI continuous monitoring. *AGU Fall Meeting Abstracts 12/2010.*



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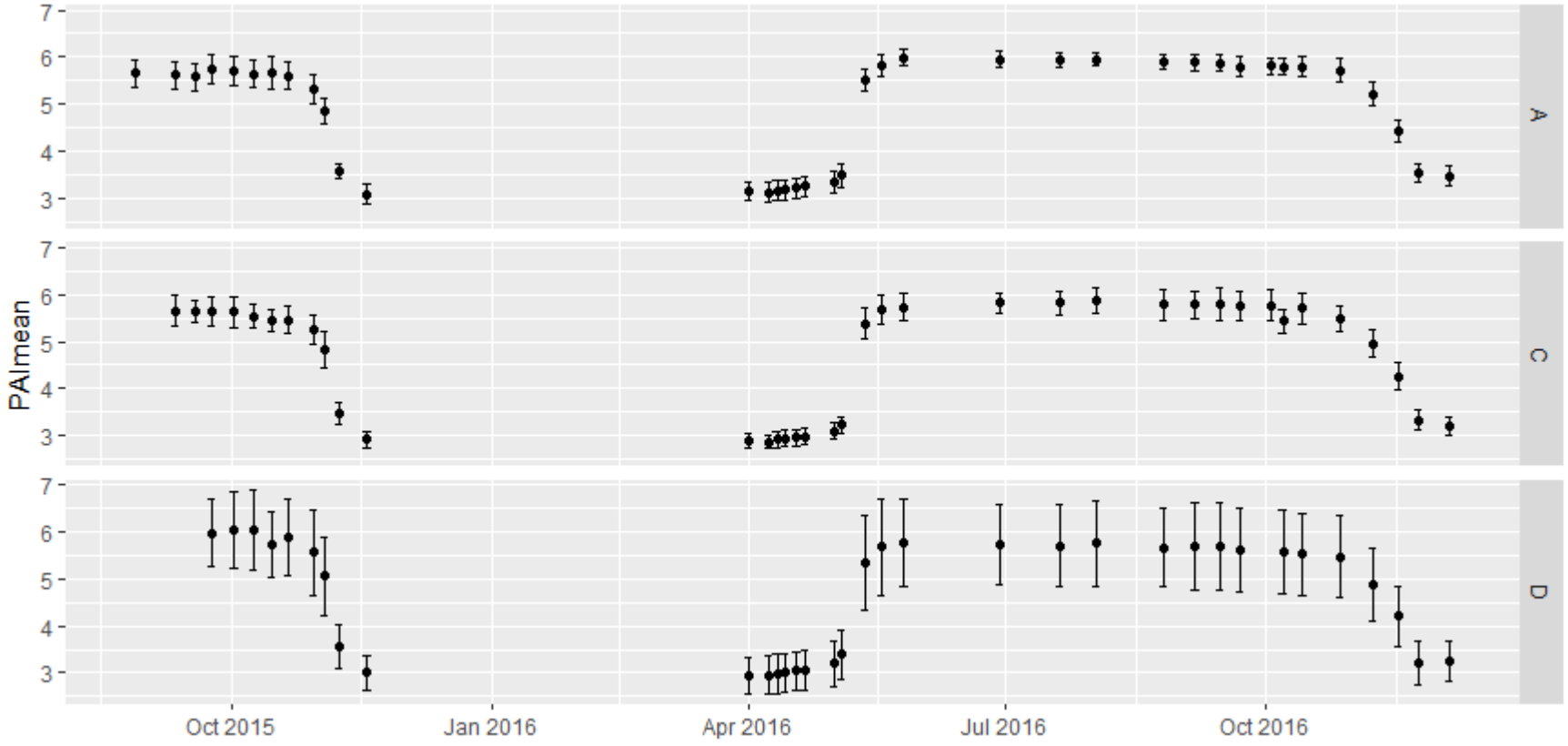
3. Monitoring Canopy Phenology

- Terrestrial Lidar campaign (RIEGL VZ-400)
- high precision/repeatability

Calders, K., et al., (2015). Monitoring spring phenology with high temporal resolution terrestrial LiDAR measurements. Agricultural and Forest Meteorology, 203, 158–168.



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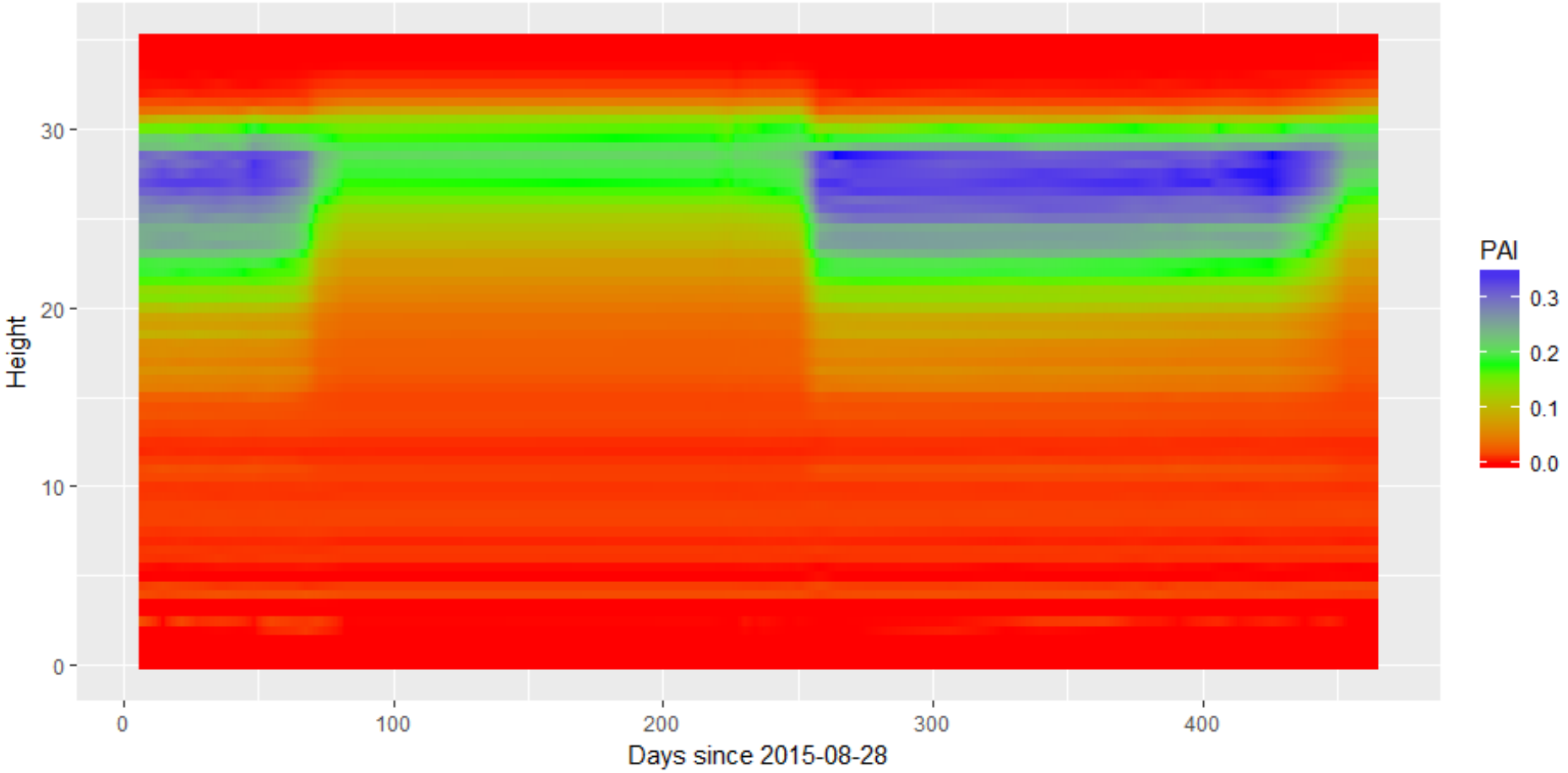
3. Monitoring Canopy Phenology

- canopy temporal 'tomography' with active TLS measurements



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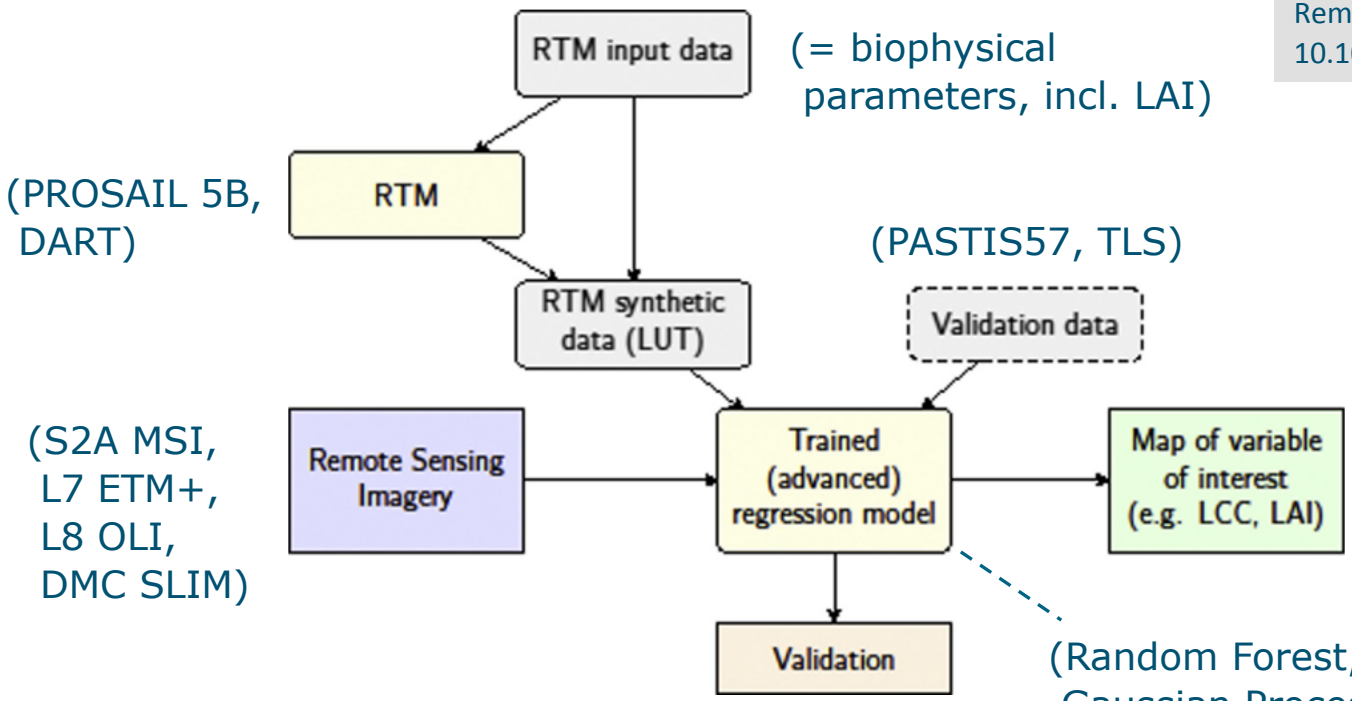
4. Biophysical Parameter Retrieval

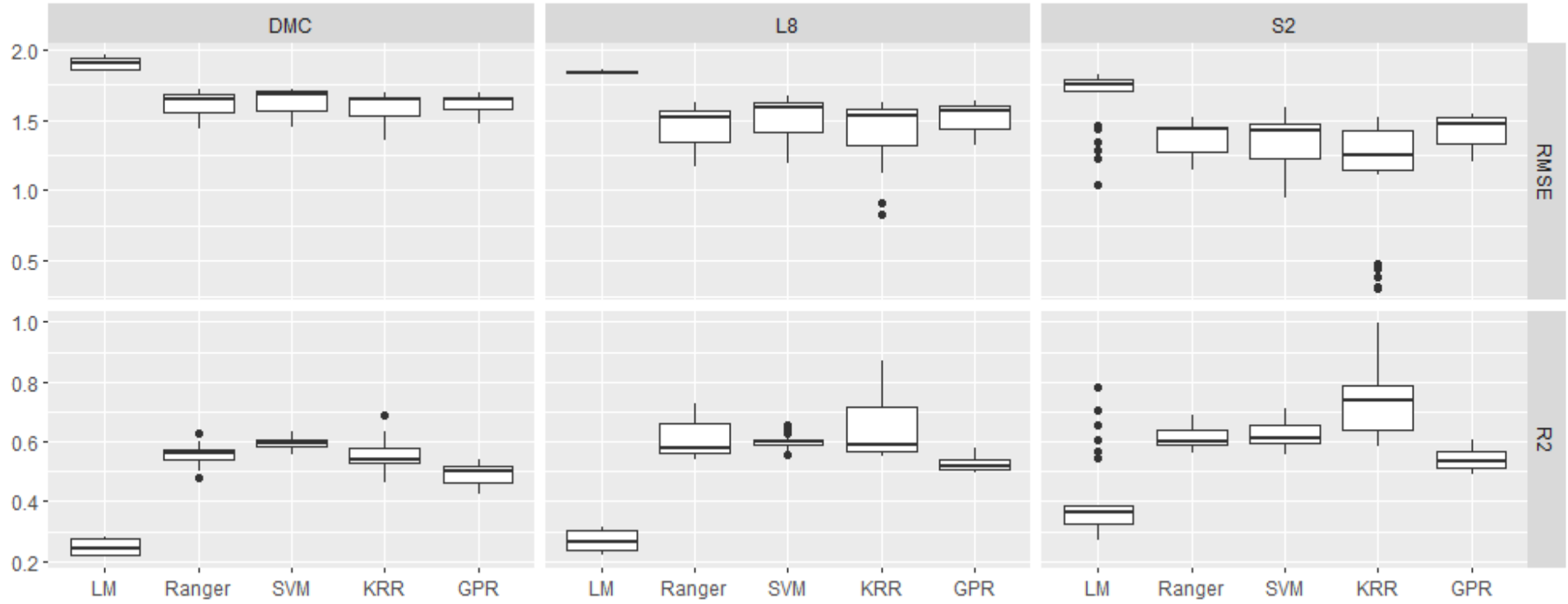
- Hybrid training approach:

Verrelst et al., 2015: Optical remote sensing and the retrieval of terrestrial vegetation bio-geophysical properties - A review, ISPRS J. Photogramm. Remote Sens. 108, 273-290. DOI: 10.1016/j.isprsjprs.2015.05.005



4. Biophysical Parameter Retrieval

- validation on synthetic data (from RTMs)
- variation from different factors (added spectral noise, using leaf spectral data, using SZA as independent variable)



Next steps

- WP1: Field campaign
  - field campaign 2017
- WP2: Monitoring phenology with autonomous instruments
  - evaluate PASTIS 2016
- WP3: Biophysical parameter retrieval
  - create LUTs with realistic background spectra > how good can performance get?
  - presentation retrieval results at RAQRS V (September 18-22, Valencia, Spain)

Thank you for your attention!

Project Site
www.wur.eu/fbprv

WU UAV Facility
http://wageningenur.nl/uarsf

WU Lidar Facility
http://wageningenur.nl/lidar

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