

Near real time, global, LAI, FAPAR and cover fraction products derived from PROBA-V, at 300m and 1km resolution

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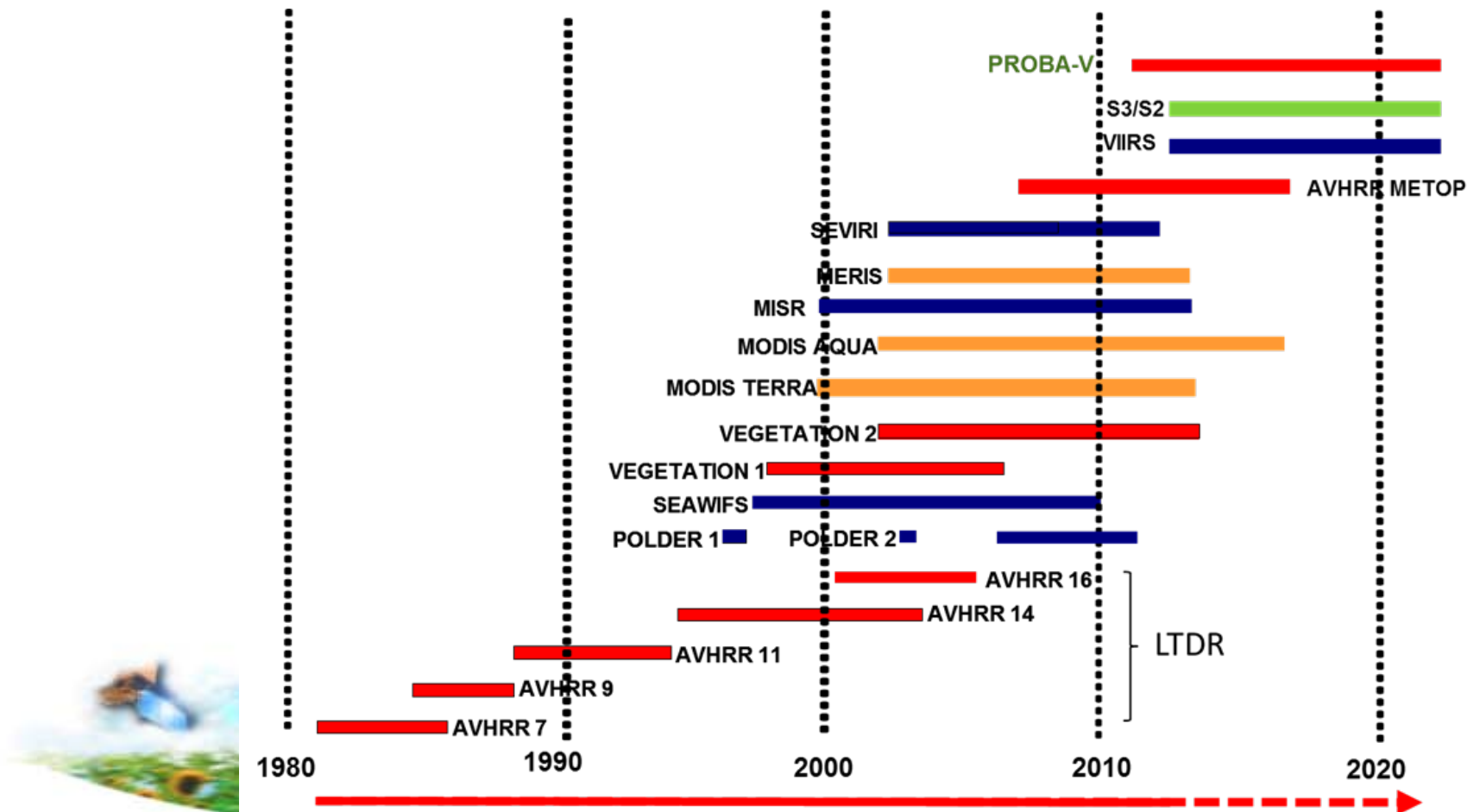
B. Smets



Context

From GEOLAND to IMAGINES:

➔ ensuring AVHRR-VEGETATION-PROBA-V Continuity
From 1981 up to now



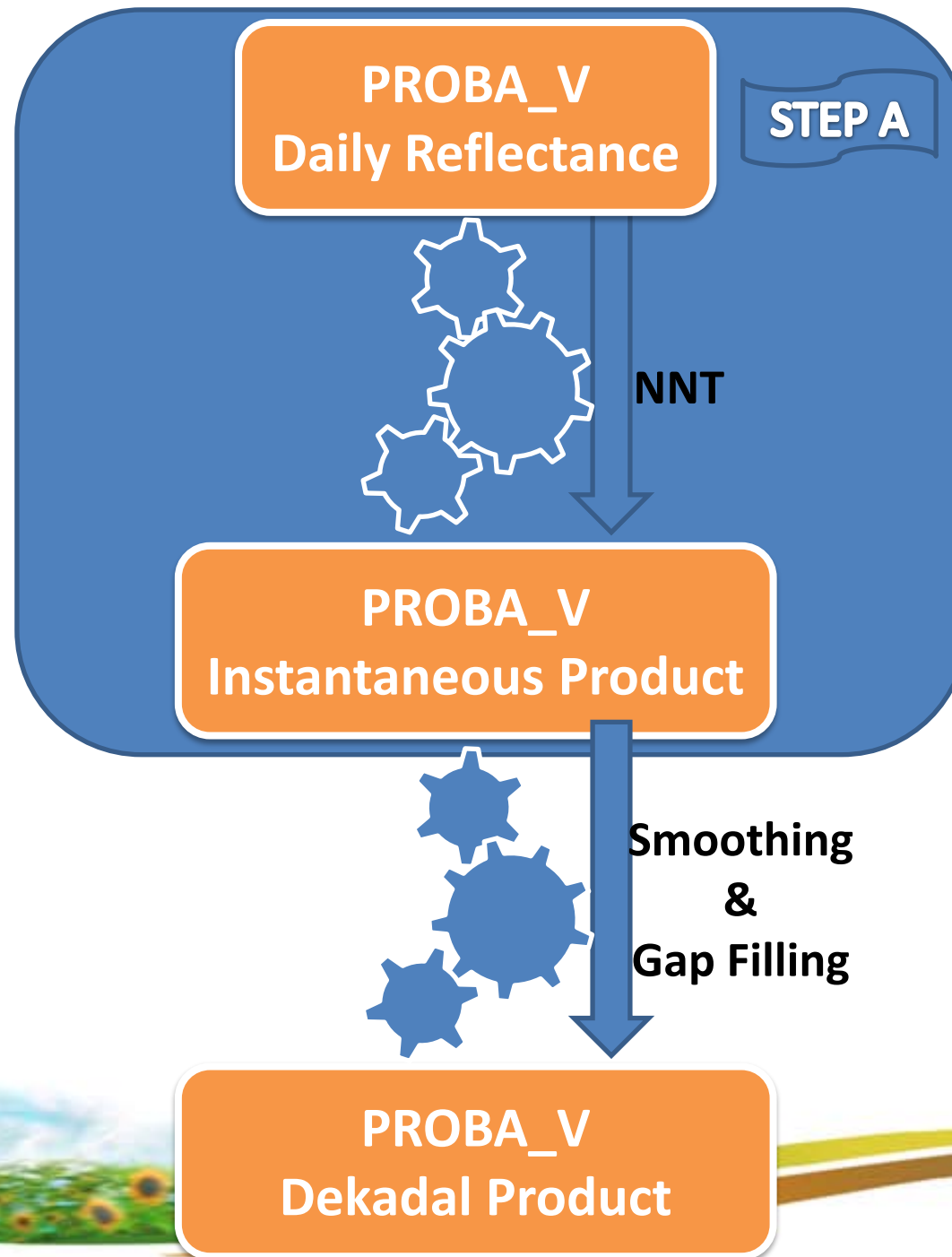
Requirements

- **LAI, FAPAR, FCOVER products for PROBA-V**
- **10 day frequency**
- **Near Real Time**
- **300m resolution (PROBA-V)**

Consistent with GEOLAND (GEOV2 products) !!!

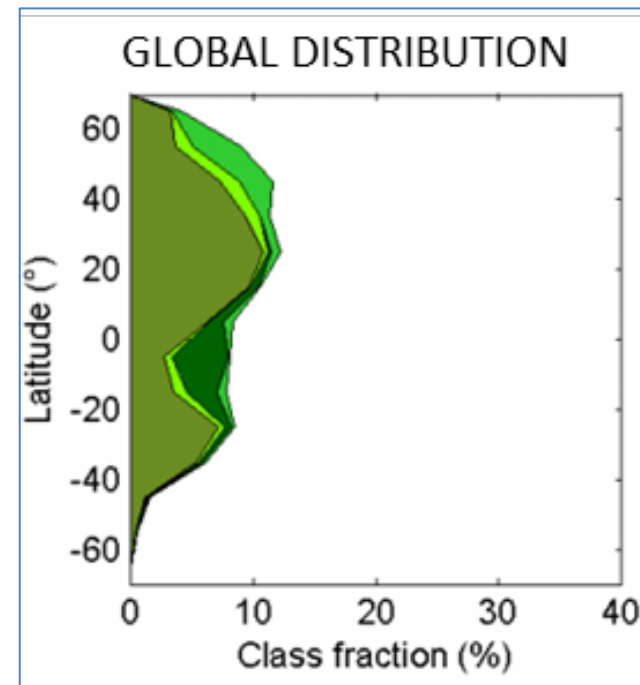
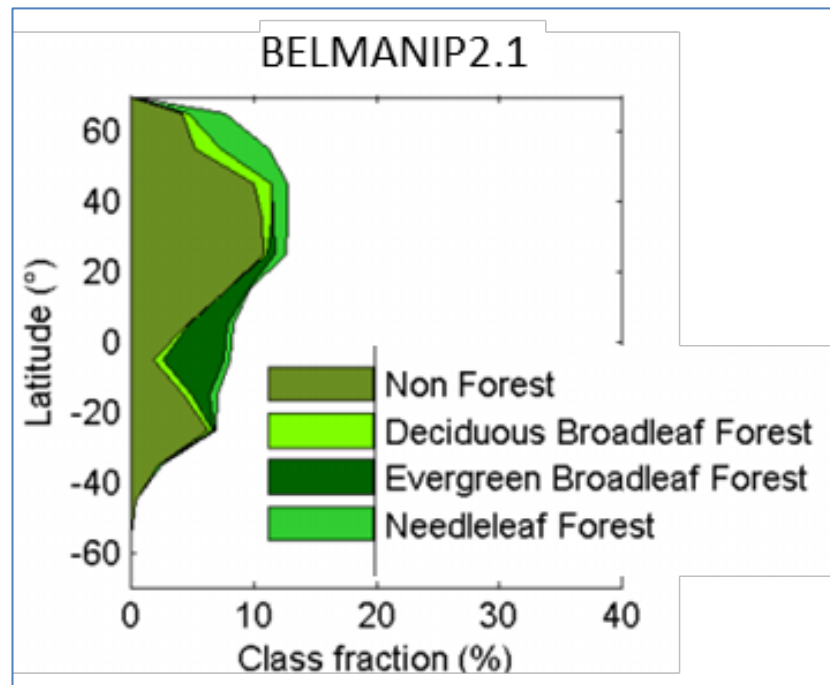


General principle



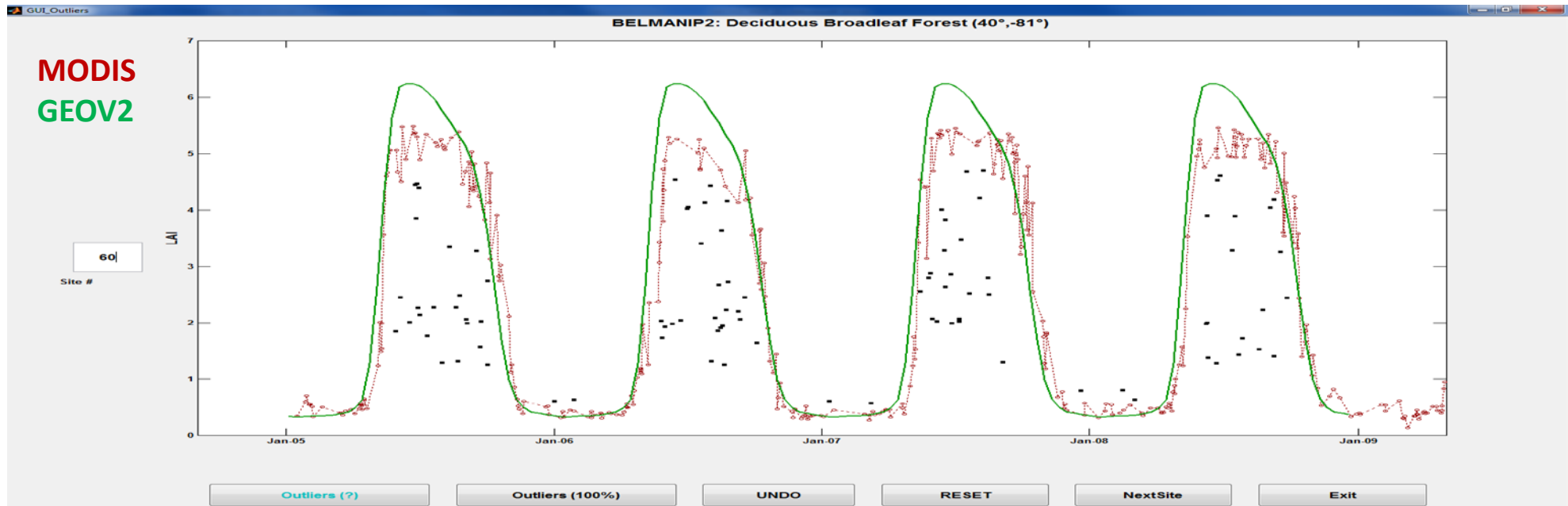
STEP A: Instantaneous Product

- Neural Networks
 - Trained over BELMANIP2.1 sites (445-3x3km²)

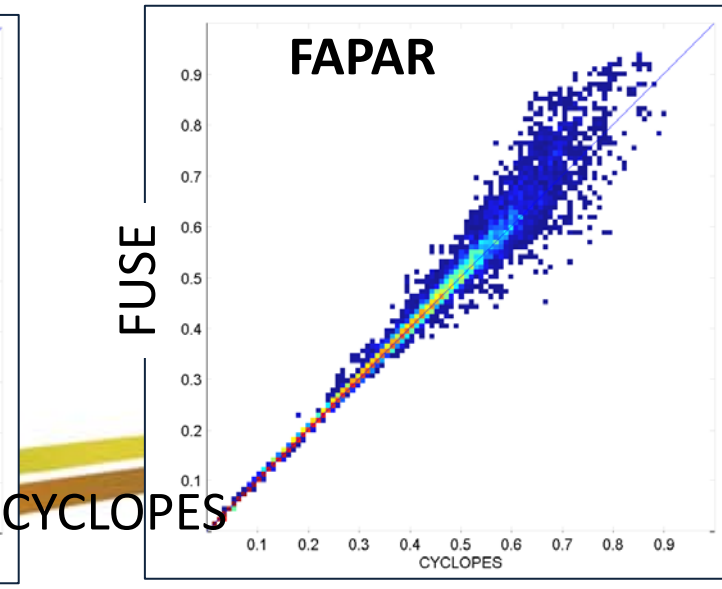
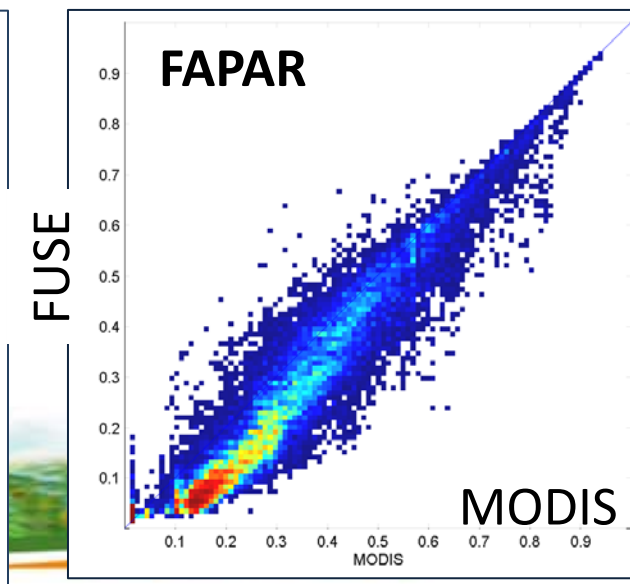
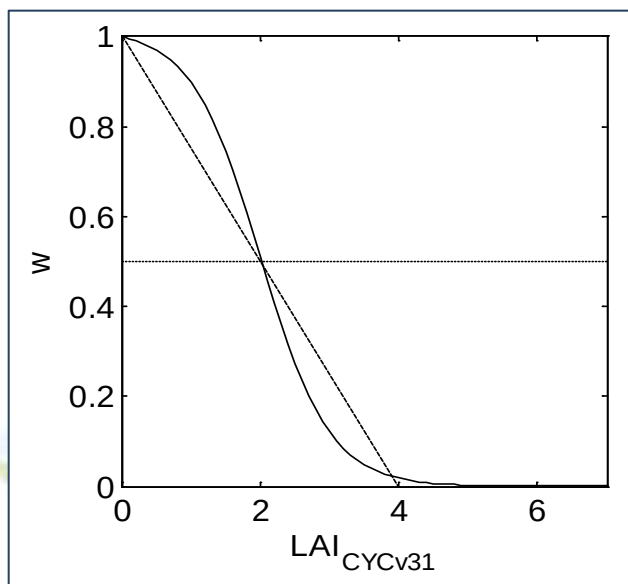


STEP A: Instantaneous Product

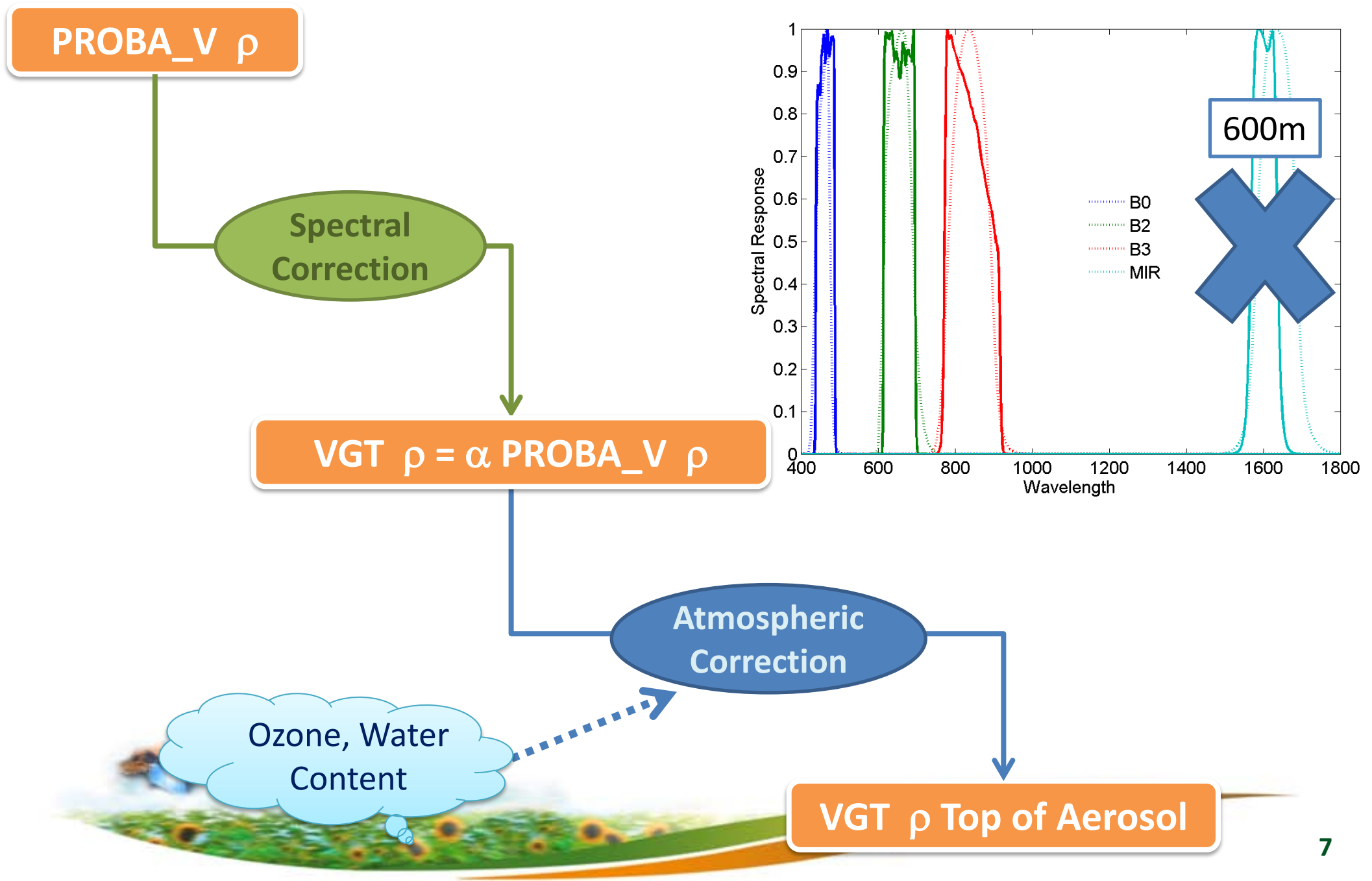
- Filtered VEGETATION data (2005-2008)



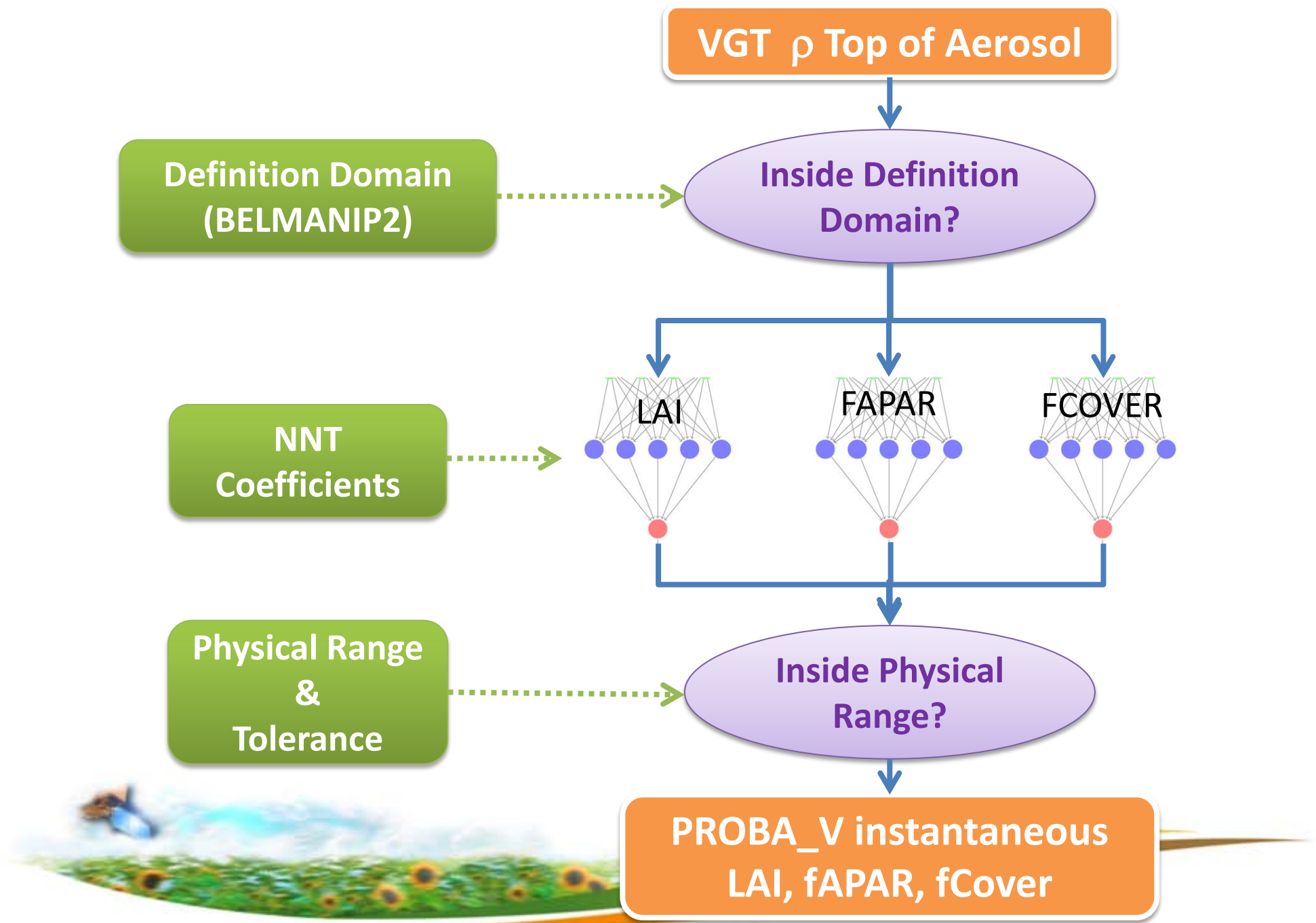
- Fused MODIS+CYCLOPES LAI, FAPAR



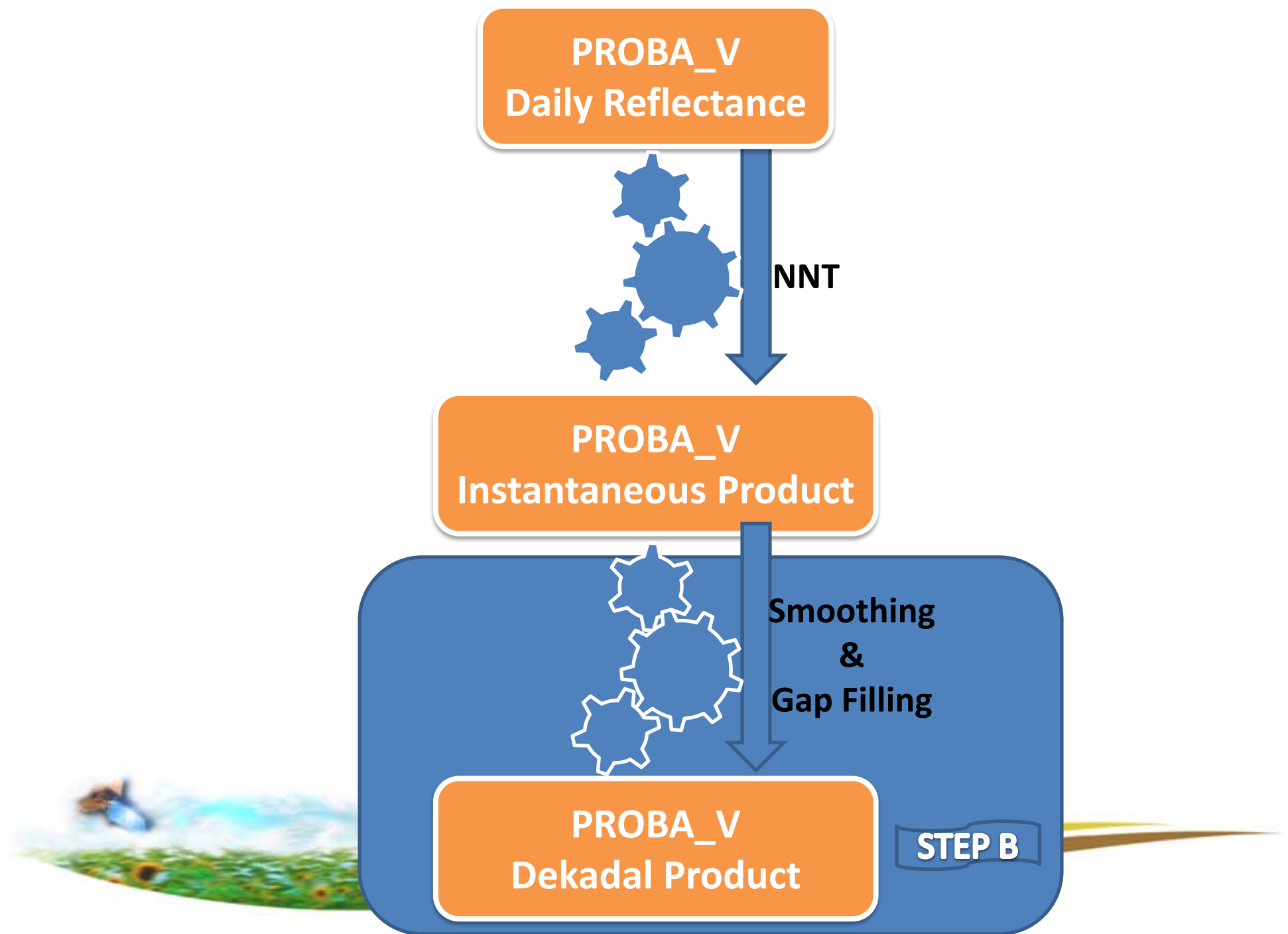
STEP A: Instantaneous Product



STEP A: Instantaneous Product



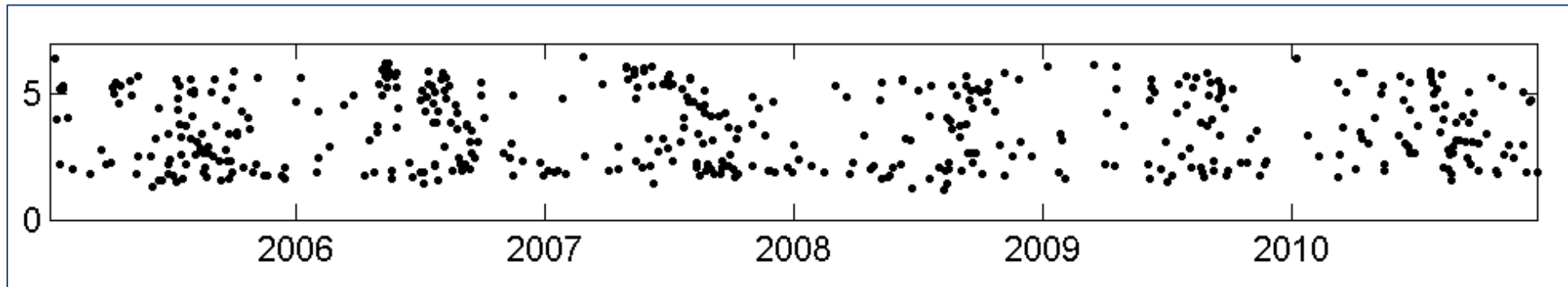
General principle



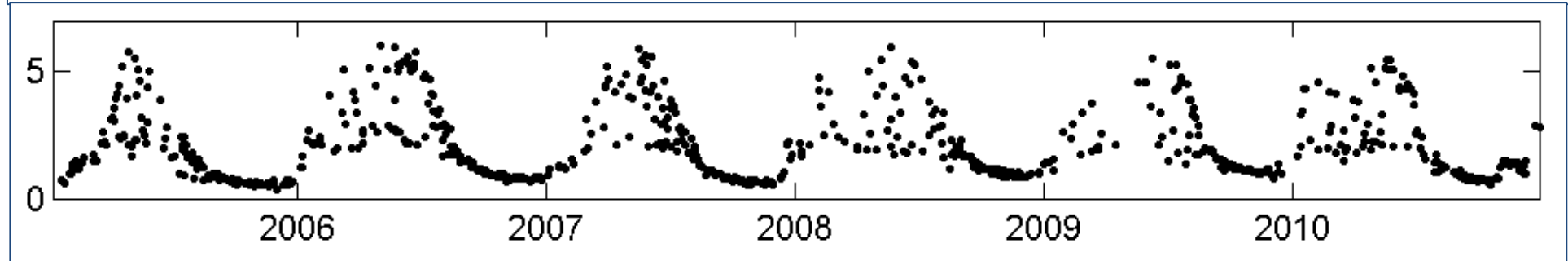
STEP B: Compositing

- Different behaviour for EBF (Noise) vs Non_EBF
 - Limited seasonality
 - Large amount of noise

EBF



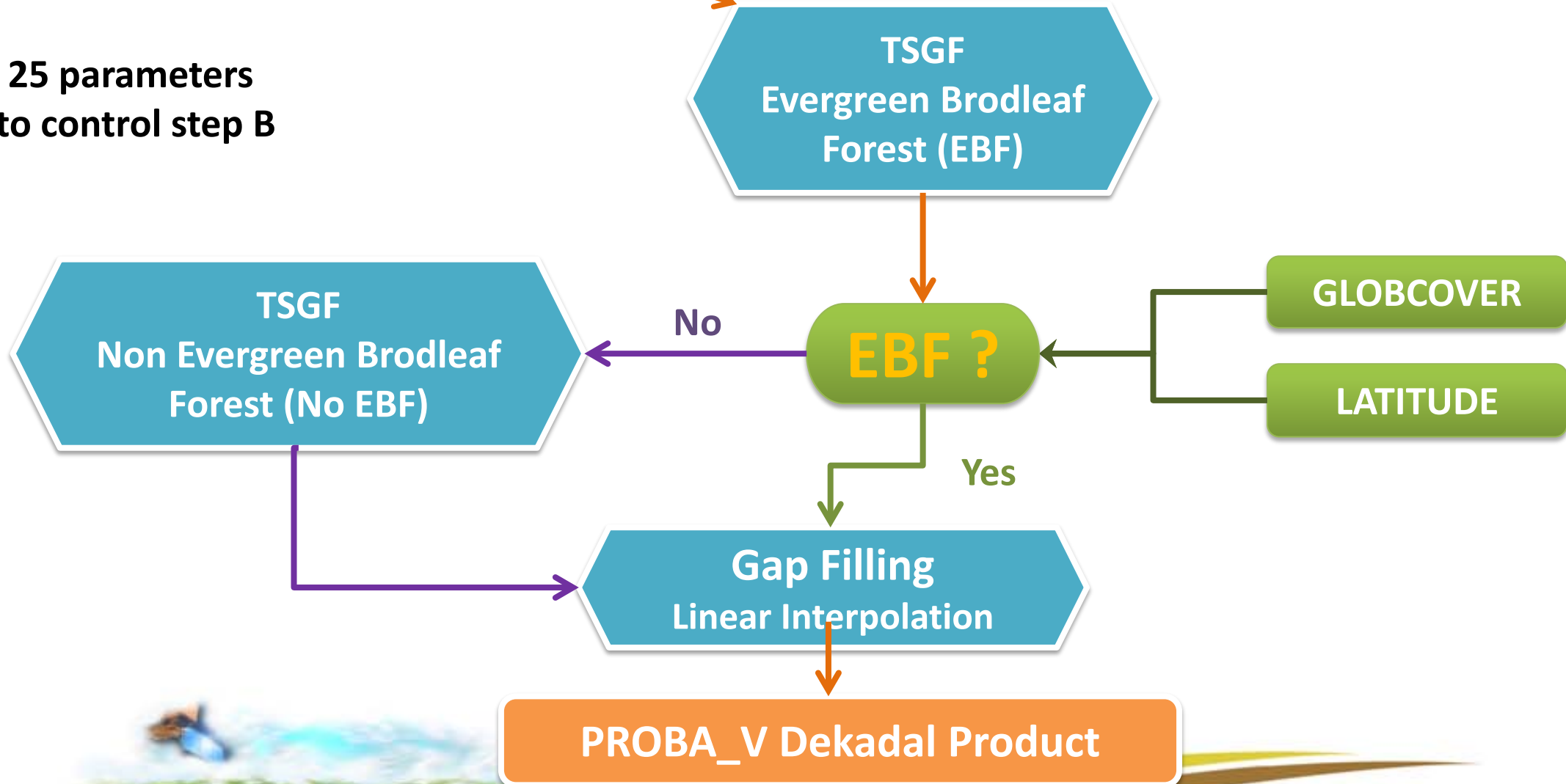
NF



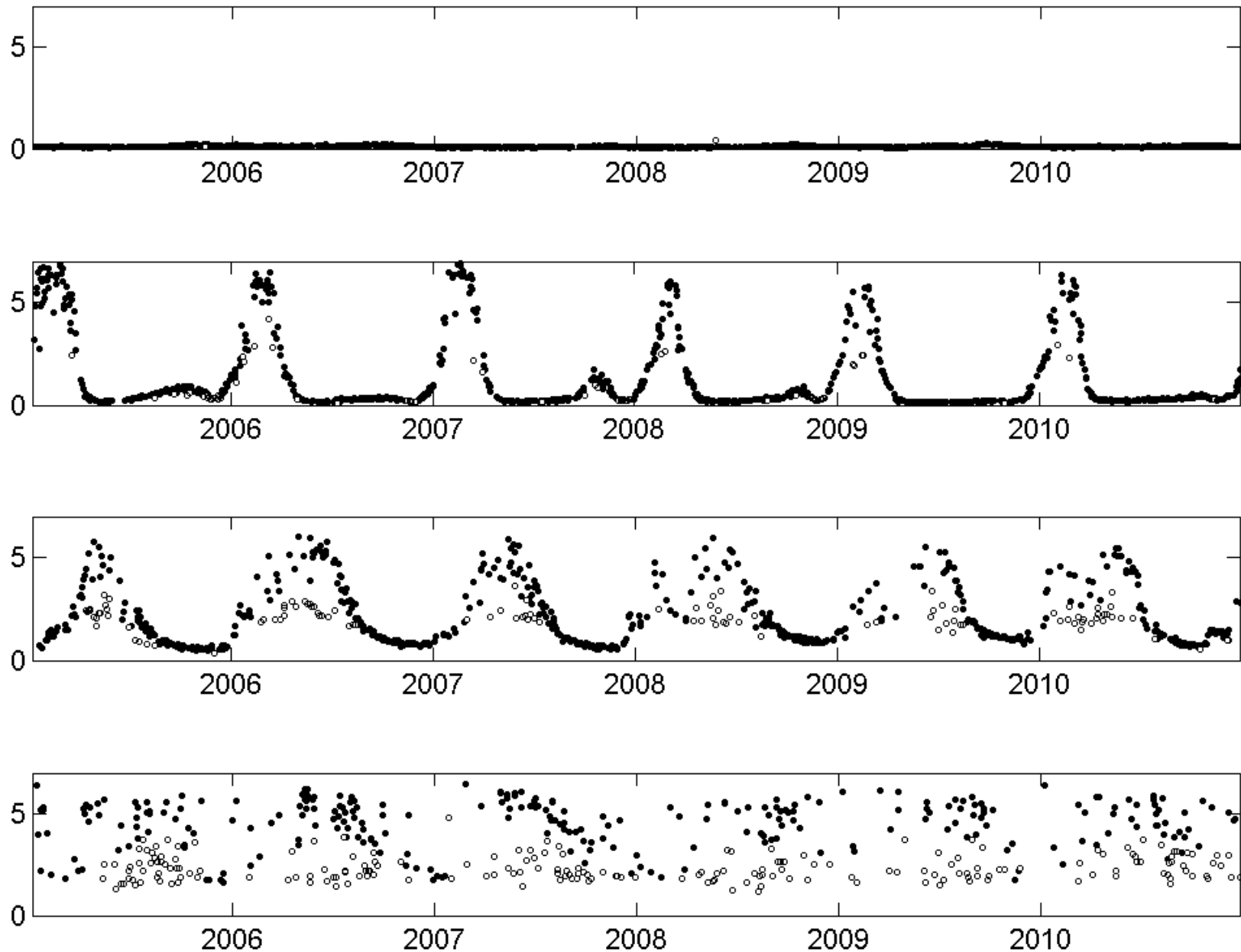
STEP B: Compositing

PROBA_V Instant. Product

25 parameters
to control step B



STEP B: Outlier Elimination

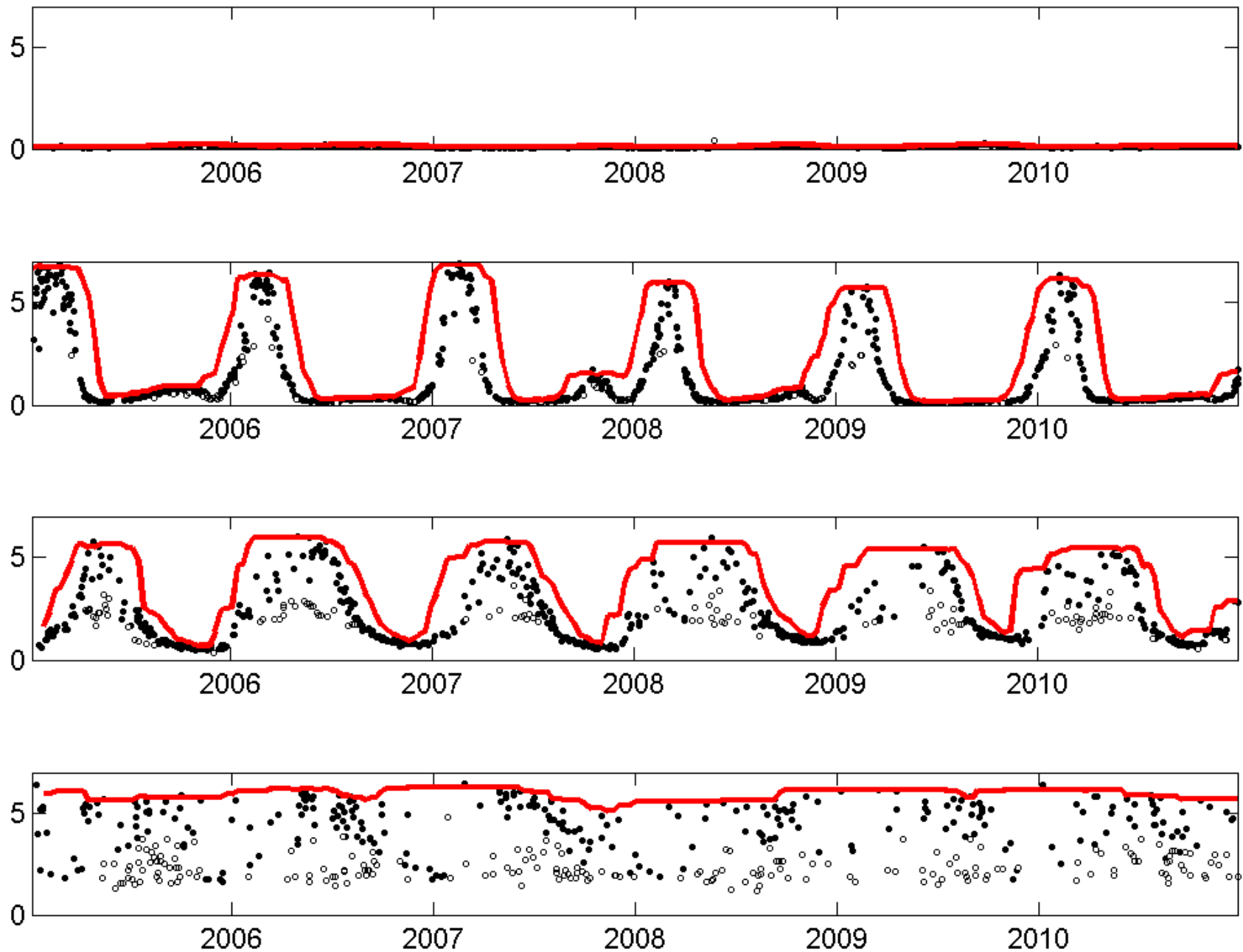


STEP B: EBF

- Pixel is considered as EBF if
 - $-28.5 < \text{Latitude} < 28.5$, $\text{LAI} > 4$
 - Noise is significant
 - Pixel was majoritarily set as EBF in the 21 previous dekads (completed with GLOBCOVER)
- For EBF pixels
 - If enough data (20) in the compositing window (max: 120 days)
 - $\text{Threshold} = \text{percentile}(\text{LAI}, 90);$
 - $\text{EBF} = \text{mean}(\text{product}(\text{LAI} > \text{Threshold}))$
 - Else previous value

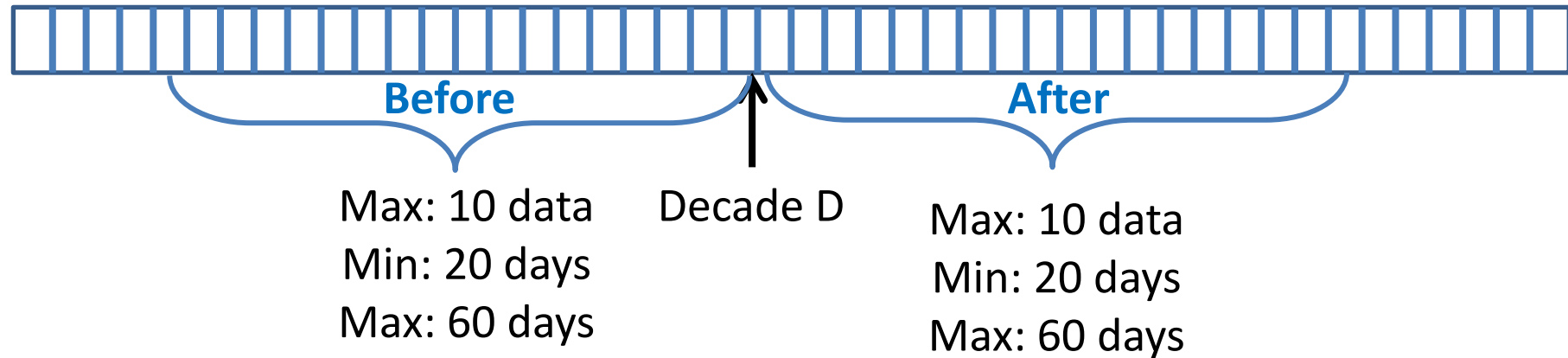


STEP B: EBF case



STEP B: Non EBF

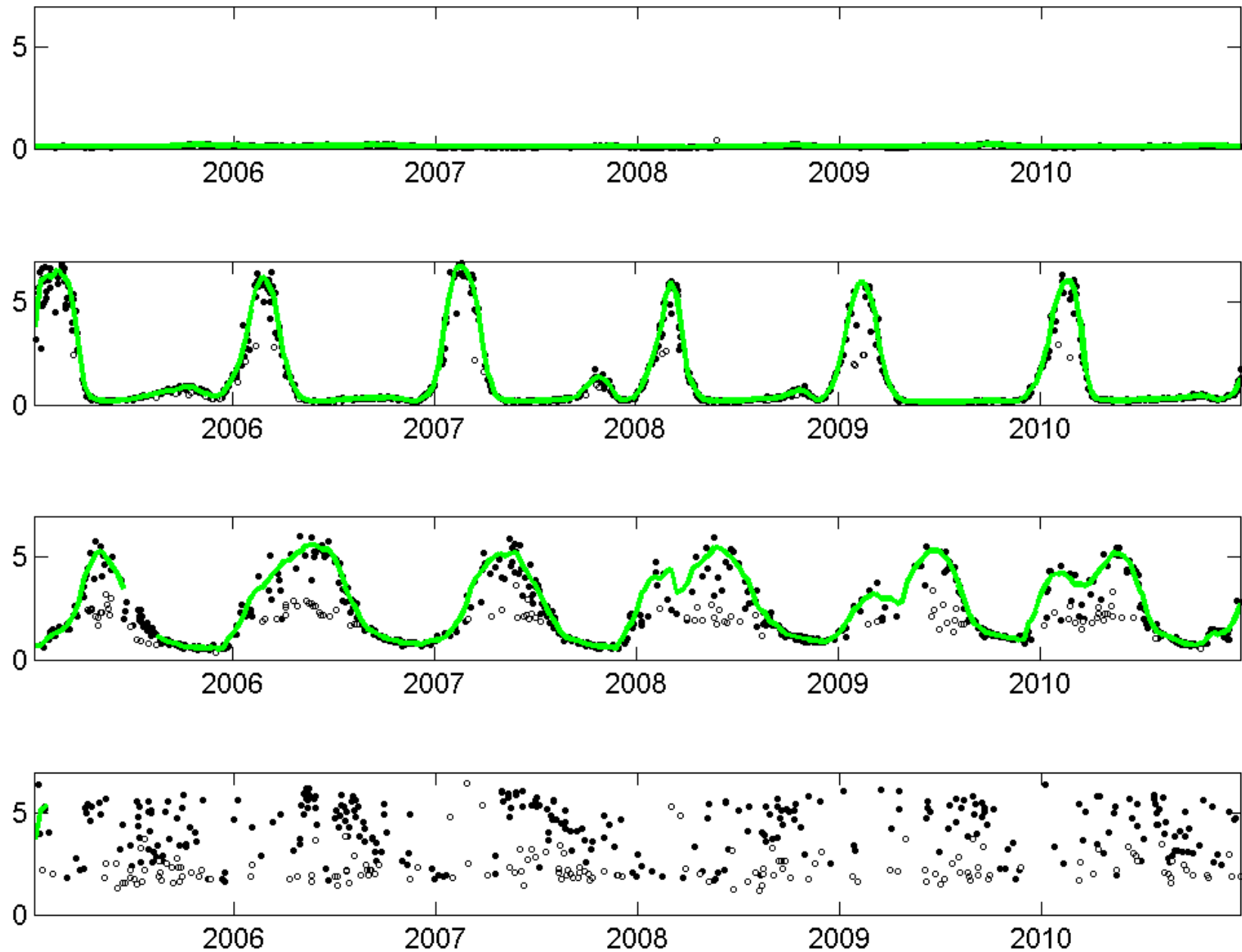
- Variable length of the compositing window:



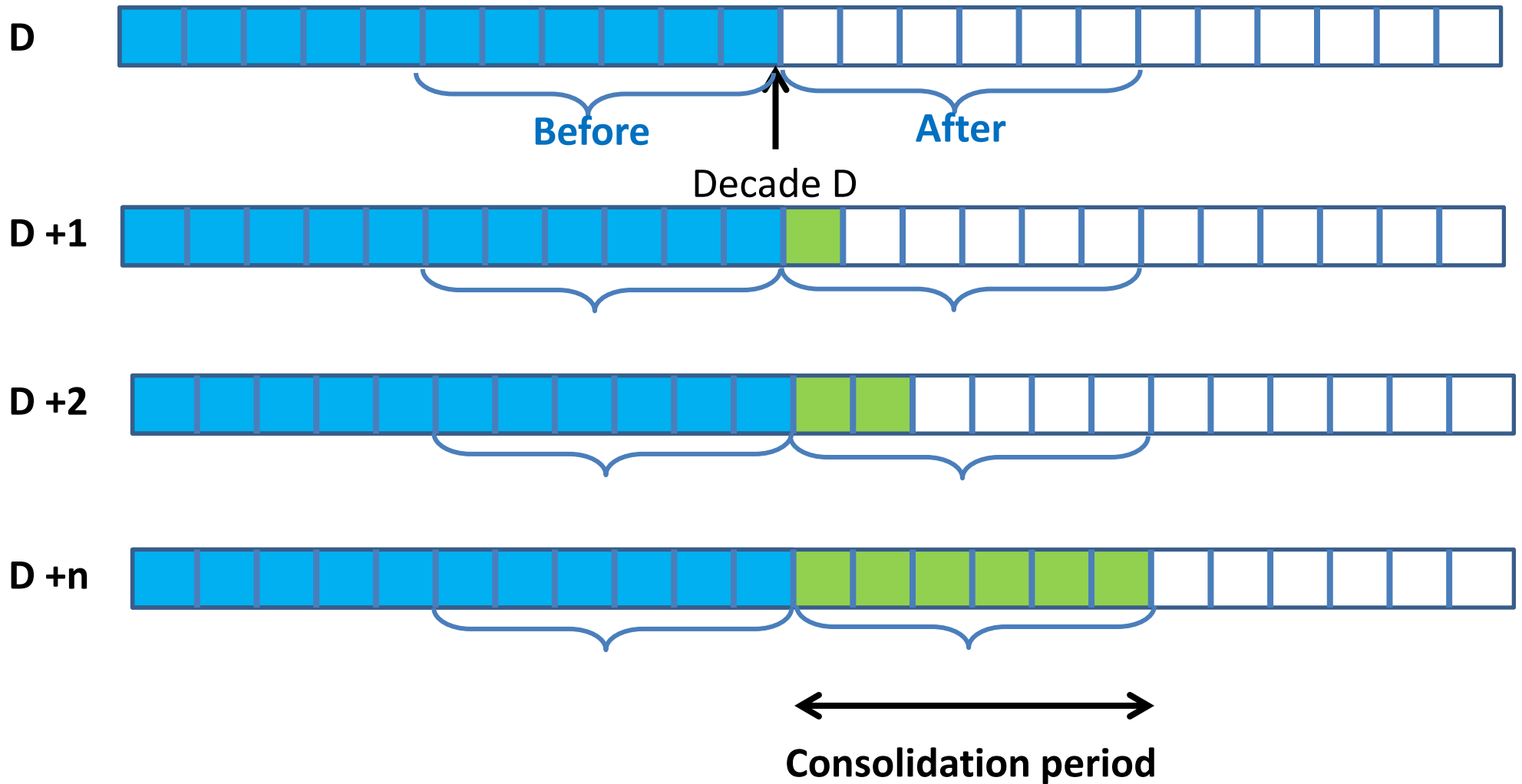
- Temporal smoothing depends on the number of available data
 - Enough data ($N_{\text{before+after}} > 5$): weighted polynomial degree 2
 - $3 < N_{\text{before+after}} > 5$: linear fit
 - Else missing data



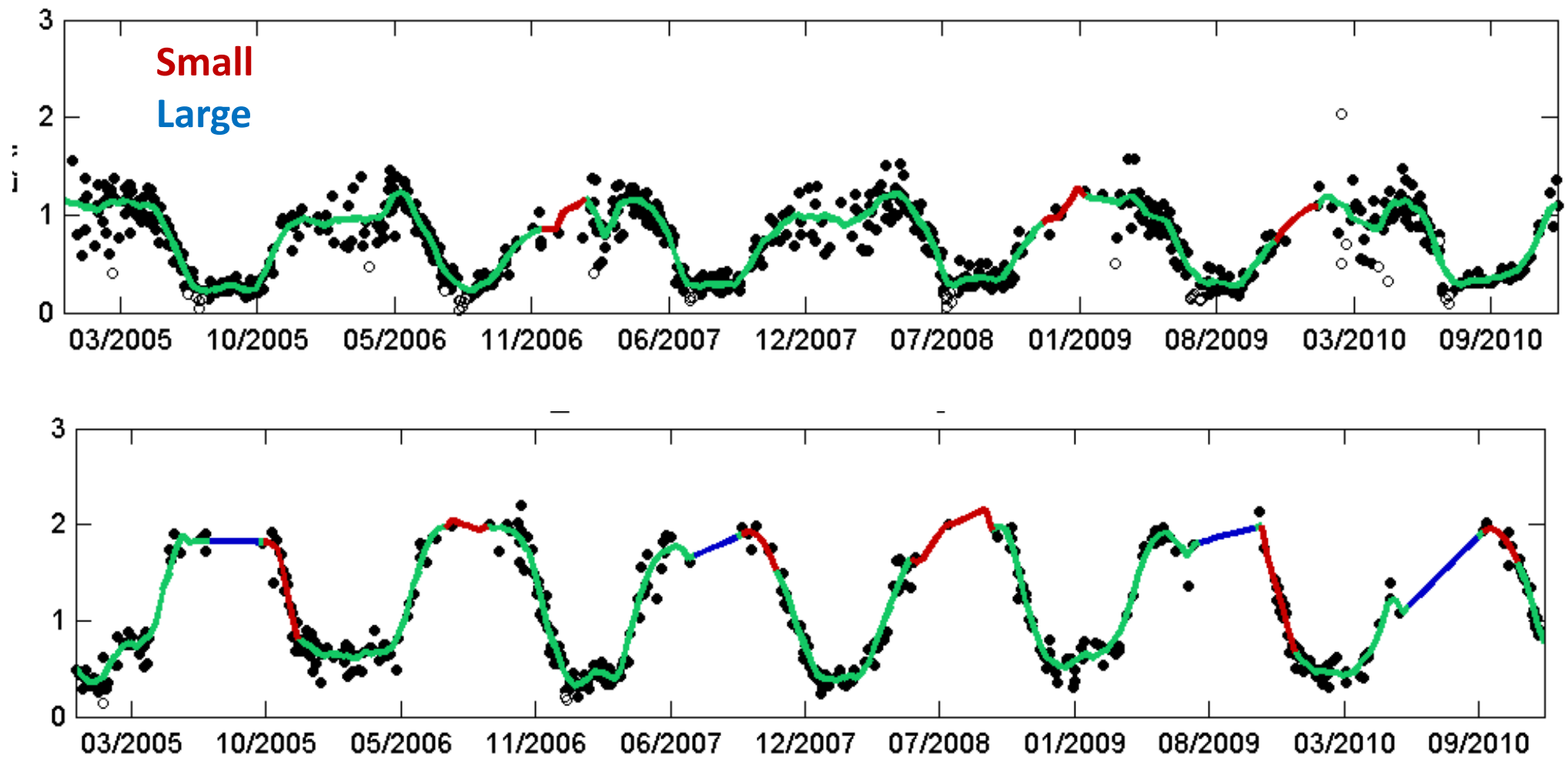
STEP B: Non EBF



Near Real Time processing



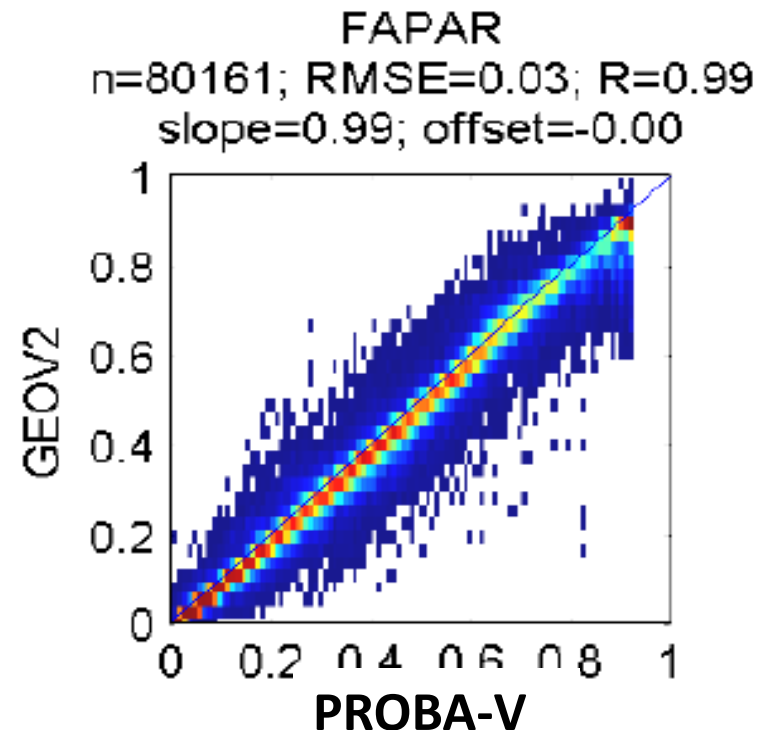
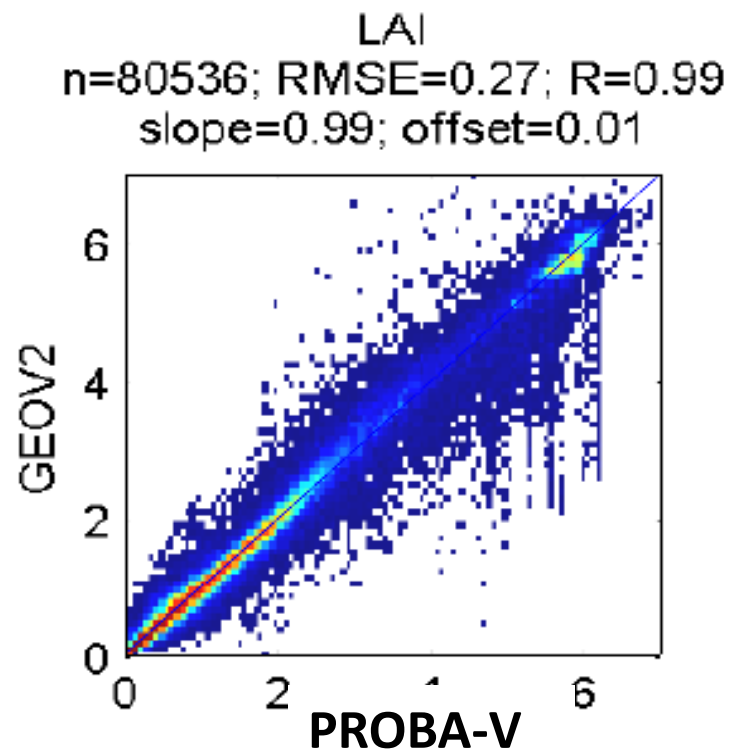
Gap filling



GEOV2 / PROBA-V

- **Main differences**

- No SWIR in Proba-V
- Refinement of NNET training data base
- Compositing
 - Use of climatology for GEOV2
 - No a priori information for IMAGINES
 - Differences in EBF identification



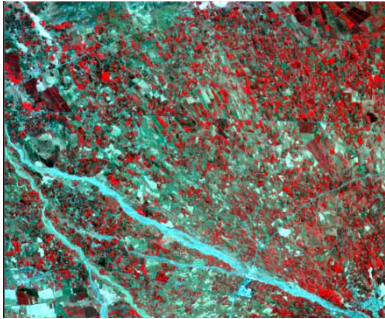
CONCLUSIONS

- **Associated quality indicators**
 - Flag
 - RMSE
 - Confidence interval from polynomial fit
- **Consistency between variables**
 - Same selection of observations used (mostly based on LAI)
- **Importance of the compositing step**
 - Without climatology (GEOV2)
 - For short term projection
- **Updating the algorithm when enough actual PROBA-V data will be available**

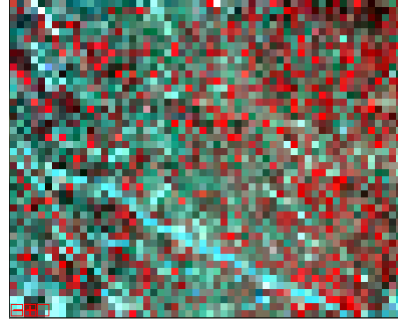


Building a longer time series: process back the MERIS archive?

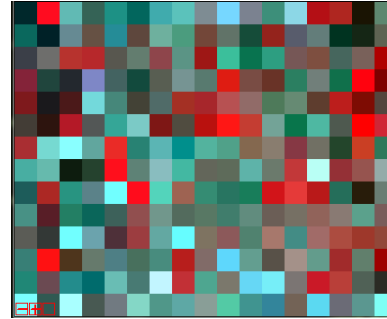
20m



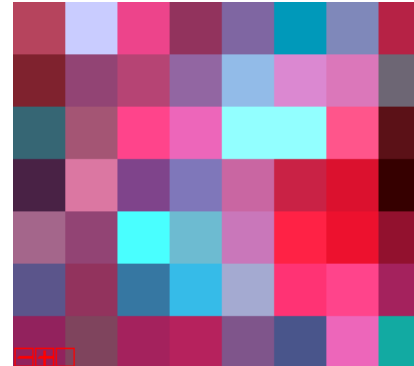
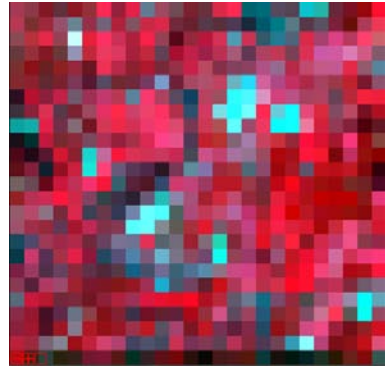
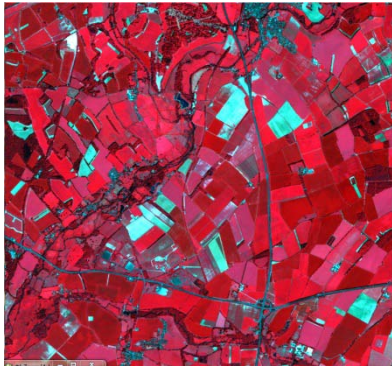
300m



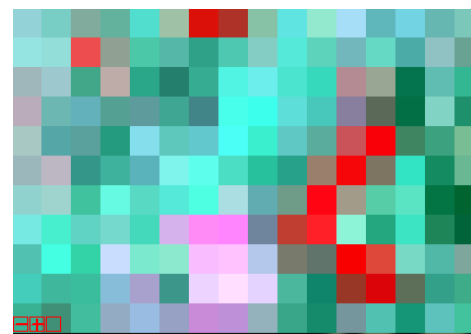
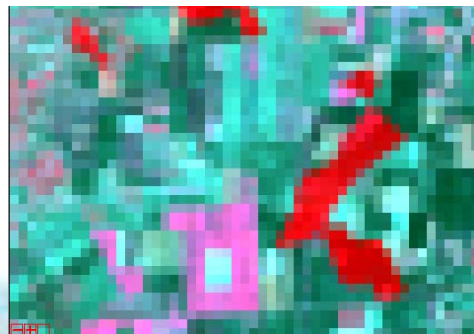
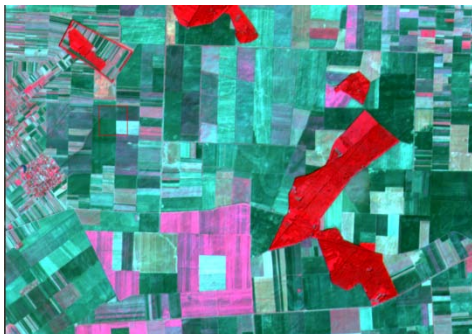
1000m



Marocco, Crops



England, Crops



Romania, Crops