LPVE23 - WORKSHOP ON LAND PRODUCT VALIDATION AND EVOLUTION

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Overview of Copernicus Global Land LAI, FAPAR and FCover from SPOT/VEGETATION to Sentinel-3/OLCI

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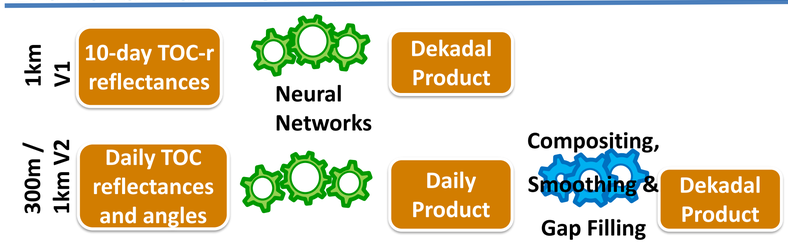
Abstract

Copernicus Global Land Service (CGLS) provides near-real time and long-term time series of leaf area index (LAI), fraction of absorbed PAR (FAPAR) and vegetation cover (FCOVER) products every 10 days at:

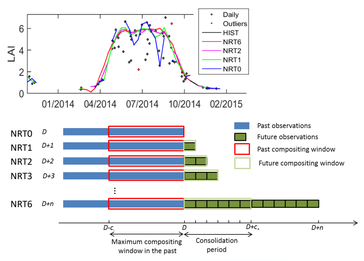
- 300 m resolution (Collection 300m) from PROBA-V (2014 – June 2020) and Sentinel-3/OLCI (July 2020 – present), and
- 1 km (Collection 1km) resolution from SPOT/VGT (1999 – 2013) and PROBA-V (2014 – June 2020).

Objectives: Description of the principles of CGLS Collection 300m and 1km LAI, FAPAR and FCOVER retrieval algorithms, and main validation results

Data and methods



https://land.copernicus.eu/global/

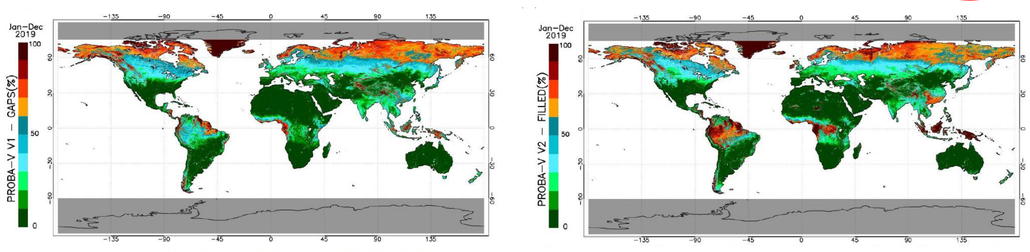


Version	Sensor	Period	Spatial resolution	Input	Temporal smoothing	Gap filling	NRT	Main improvement
1km V1	SPOT/VGT PROBA-V	1999 – 2013 2014 – June 2020	1km	30-day red/NIR/SWIR normalized TOC-r	Reflectance level	✗	✗ 12-day lag	Accuracy
1km V2	SPOT/VGT PROBA-V	1999 – 2013 2014 – June 2020	1km	Daily red/NIR/SWIR TOC-r & angles	Product level	✓	✓	NRT, temporal consistency & product completeness
300m V1	PROBA-V OLCI Sentinel-3	2014 – June 2020 July 2020 – present	300m	Daily red/NIR PV 12 bands OLCI TOC-r & angles	Product level	✓	✓	Spatial resolution

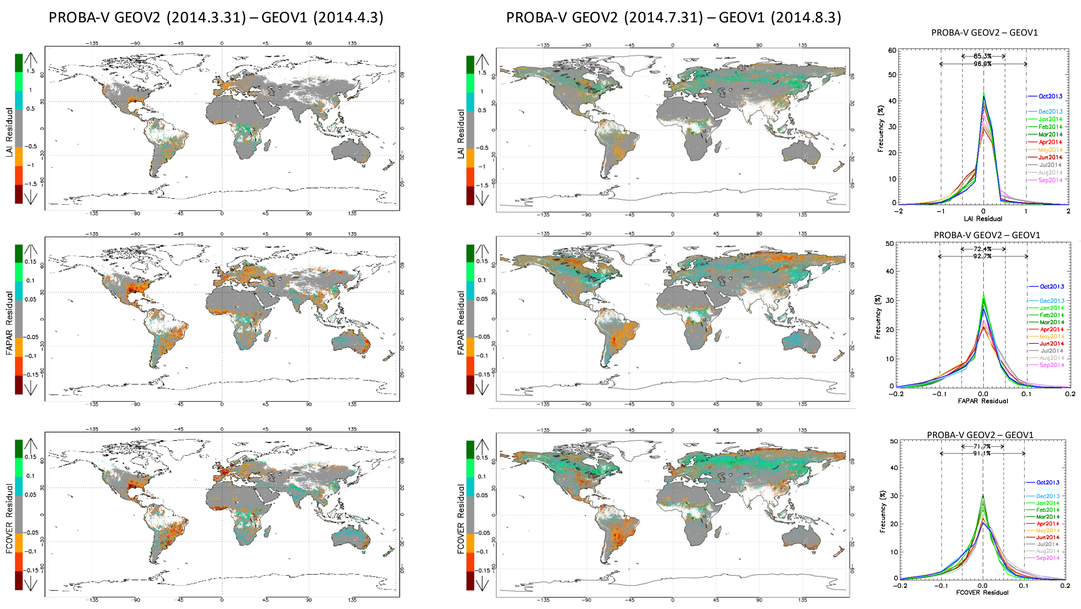
Geolocation issue in S3 TOC data V1 July'20-June'22

Results

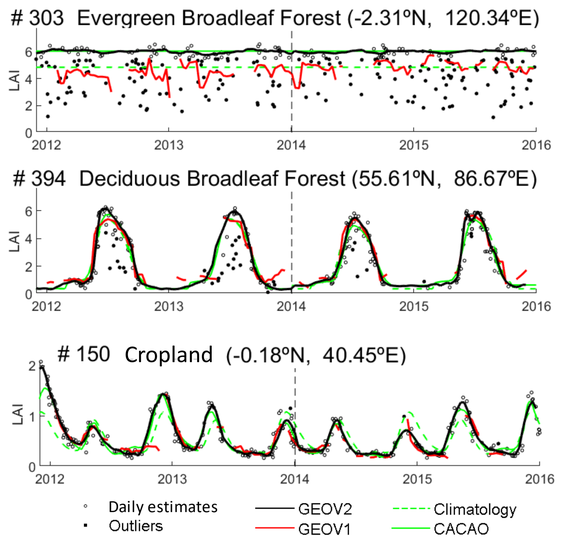
Product completeness

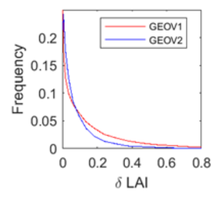


Spatial consistency

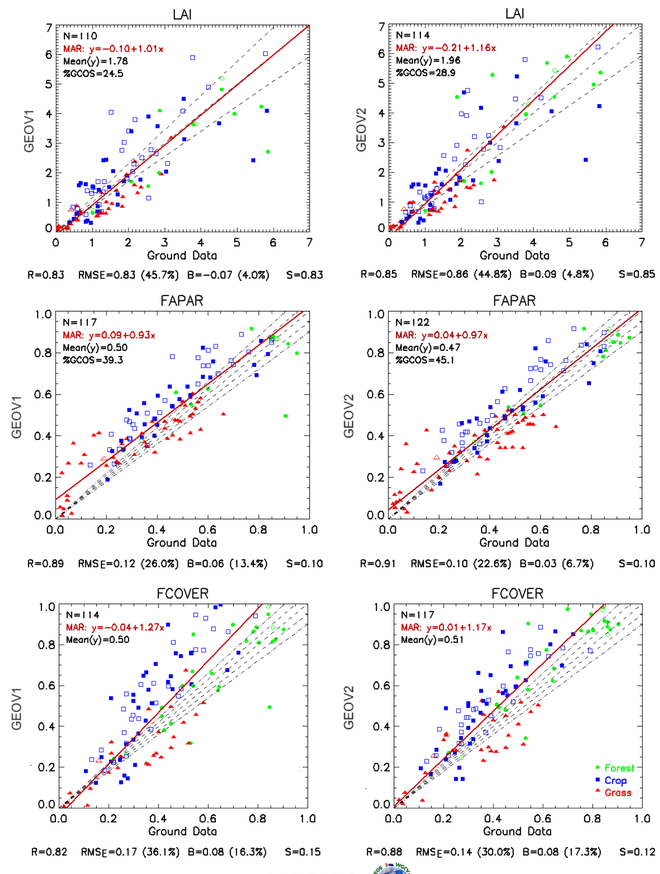


Temporal consistency



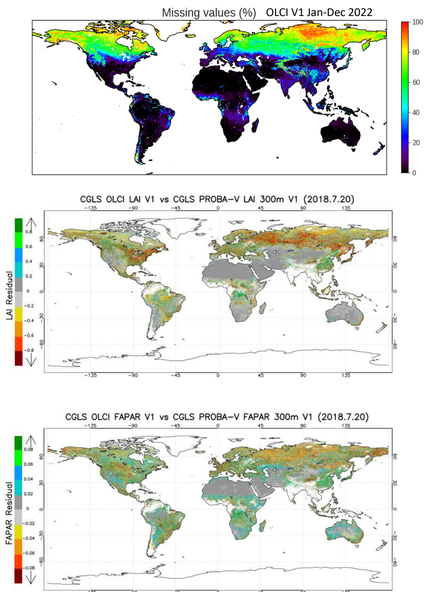


Accuracy assessment

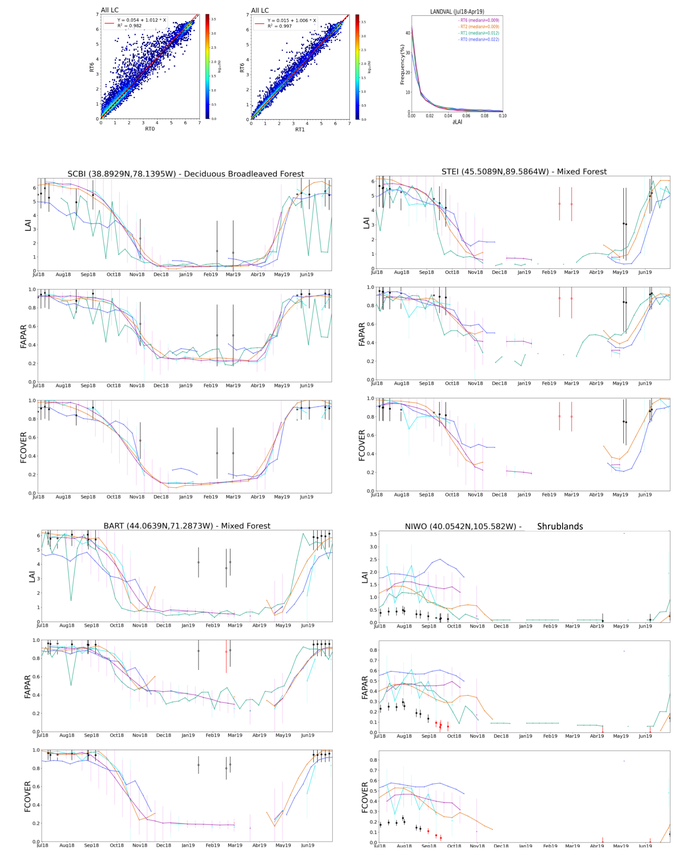


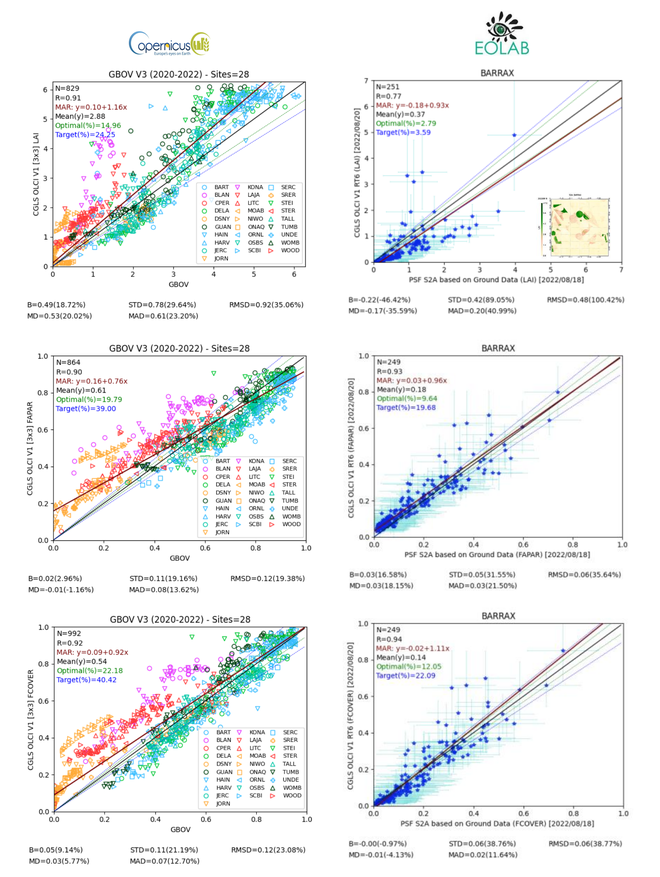
DIRECT2

Collection 1km



Collection 300m





- CGLS OLCI V1 (RT6) - CGLS OLCI V1 (RT0) - CGLS PBV 300m V1 - VNP15A2H C1- EPS VEGA . GBOV V3

Conclusions

- ✓ **CGLS V2 and V1 1km** are consistent at the global scale and meet GCOS requirements in 90% of cases for LAI, and 80% for FAPAR and FCover.
- ✓ V2 showed a similar accuracy as V1 for LAI and slight improvements for FAPAR and FCover over DIRECT2.0 sites.
- ✓ V2 highly improves V1 in terms of product completeness and it shows no missing data due to climatological gap filling.
- ✓ V2 corrects inconsistencies in V1 at high northern latitudes and for evergreen broadleaf forests, and improves intra-/inter-annual precision.
- ✓ Ensured continuity of **CGLS 300m** time series from PROBA-V to OLCI Sentinel-3.
- ✓ High agreement between NRT modes with an improvement in intra-annual precision after 1 dekad (i.e. RT1 is smoother than RT0).
- ✓ OLCI V1 shows similar temporal trajectories as PROBA-V V1, VNP15A2H and EPS VEGA products and GBOV ground measurements.
- ✓ CGLS 300m products will be reprocessed using C2 of PROBA-V and OLCI data corrected of the geolocation issue.
- ✗ Not enough **ground data** to reach levels 3-4 of CEOS LPV hierarchy.
- ✗ Not enough quality control of ground based maps (e.g. up-scaling methods of GBOV): reference should follow CEOS validation good practices and be thoroughly documented.

References

Baret et al. (2013). *RSE, 137*, 299-309
Camacho et al. (2013). *RSE, 137*, 310-329
Fuster et al. (2020). *Remote Sensing, 12*, 1017
Verger et al. (2014). *IEEE J-STARS, 7*, 3473-3481

ATBDs, PUMs and QARs are available in the Technical Library:
https://land.copernicus.eu/global/documents/products

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