

# CONSISTENCY ASSESSMENT OF PROBA-V AND SPOT-VEGETATION GEOV1 LAI, FAPAR AND FCOVER PRODUCTS FOR THE CONTINUITY OF THE



## COPERNICUS GLOBAL LAND SERVICE

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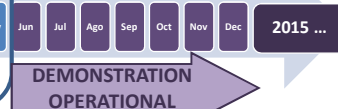
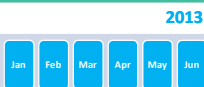


### ABSTRACT

From 1<sup>st</sup> January 2013, the Copernicus Global Land Service is operational, providing continuously a set of biophysical variables over the whole globe at 1 km spatial resolution. The SPOT-VEGETATION sensor, used for the generation of several biophysical variables, ended as Earth Observation mission by May 2014. The service continuity will be assured by the exploitation of PROBA-V data, before the launch of Sentinel 3. The Global Land Service production of GEOV1 products will continue based on PROBA-V 1 km datasets to ensure a continuity of the available services.



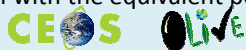
1998-2012



### METHODOLOGY

#### EARLY VALIDATION

- Limited test data set available (Nov'13-May'14).
- Focused on the inter-comparison with the equivalent period of SPOT/VGT GEOV1 products.



Quality Criteria	Product evaluated	Reference Product	Coverage
Completeness	GEOV1 PROBA-V	GEOV1 SPOT/VGT Missing data (gaps) per date	Global
Spatial Consistency	GEOV1 PROBA-V	GEOV1 SPOT/VGT	Global
Statistical Analysis	GEOV1 PROBA-V	GEOV1 SPOT/VGT 445 BELMANIP2.1 sites PDF (Values and Bias) & Scatter-plots (R <sup>2</sup> , RMSE, Bias, Scattering) per Biomes / Continent	
Temporal Consistency	GEOV1 PROBA-V	GEOV1 SPOT/VGT 445 BELMANIP2.1 sites	
		Temporal variations over the four months period	

#### QUALITY ASSESSMENT

New products which must pass an exhaustive scientific evaluation before to be implemented operationally.

#### QUALITY MONITORING

Verify that the Operational products (recent) keep the same level of quality along the time than the fully validated products

### EARLY VALIDATION RESULTS

#### SPATIAL CONSISTENCY

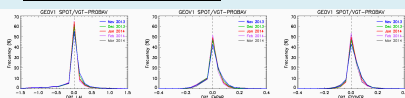


Figure 1: Distribution of the difference between GEOV1 SPOT/VGT and PROBA-V for LAI (left), FAPAR (middle) and FCOVER (right). The central date of each month during the period is displayed.

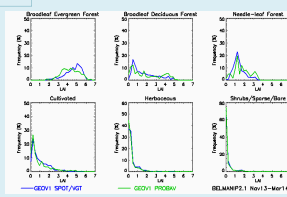


Figure 2: Distribution of GEOV1 LAI values derived from SPOT/VGT or PROBA-V for the BELMANIP-2.1 sites during the November 2013-April 2014 period for each biome type.

#### STATISTICAL ANALYSIS

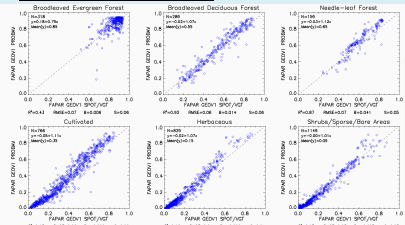


Figure 3: FAPAR GEOV1 PROBA-V product versus FAPAR GEOV1 SPOT/VGT product scatter-plots over BELMANIP-2.1 sites for the November 2013-April 2014 period for each land cover type. The terms B and S represent the mean and the standard deviation of the difference between the PROBA-V products displayed in the y axis and the validated SPOT/VGT products shown in the x axis.

#### TEMPORAL CONSISTENCY

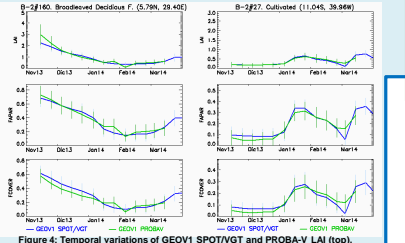


Figure 4: Temporal variations of GEOV1 SPOT/VGT and PROBA-V LAI (top), FAPAR (middle) and FCOVER (bottom) products. Vertical bars correspond to the uncertainties of GEOV1 products.

### CONCLUSIONS

GEOV1 LAI, FAPAR and FCOVER estimates from PROBA-V data were found consistent with that of GEOV1 based on SPOT/VGT observations, with some systematic differences lying below the accuracy level of the products. The temporal variations of PROBA-V were found consistent with that of SPOT/VGT GEOV1 products over this five month period. Additional data is needed to perform a more detailed quality assessment.

### FIRST QUALITY MONITORING RESULTS

#### PRODUCT COMPLETENESS

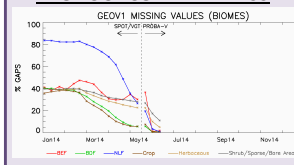


Figure 5: Temporal variations of GEOV1 missing values per biomes (Top) and regions (Bottom).

#### SPATIAL CONSISTENCY

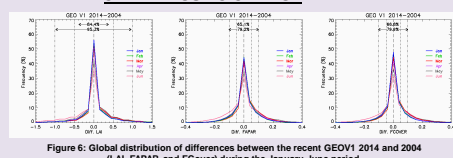


Figure 6: Global distribution of differences between the recent GEOV1 2014 and 2004 (LAI, FAPAR and FCOVER) during the January-June period.

#### INTER-ANNUAL PRECISION

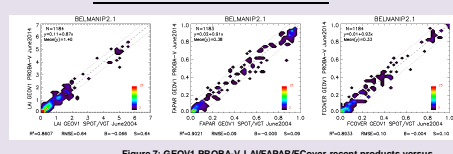


Figure 7: GEOV1 PROBA-V LAI/FAPAR/FCover recent products versus GEOV1 SPOT/VGT validated products scatter-plots over all BELMANIP-2.1 sites for June. The terms B and S represent the mean and the standard deviation of the difference between the recent products (y axis) and the validated products (x axis).

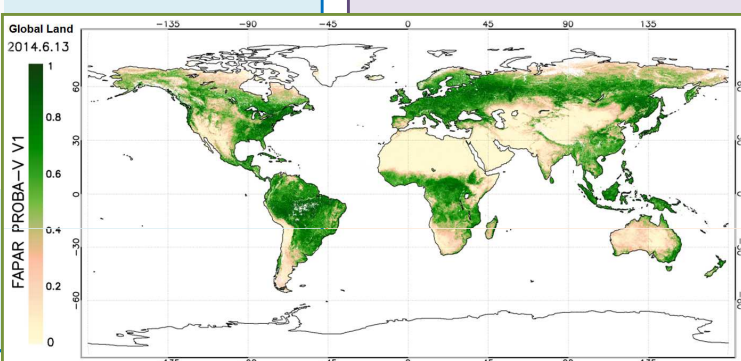


Figure 8: GEOV1 PROBA-V FAPAR global map for June 13th, 2014.

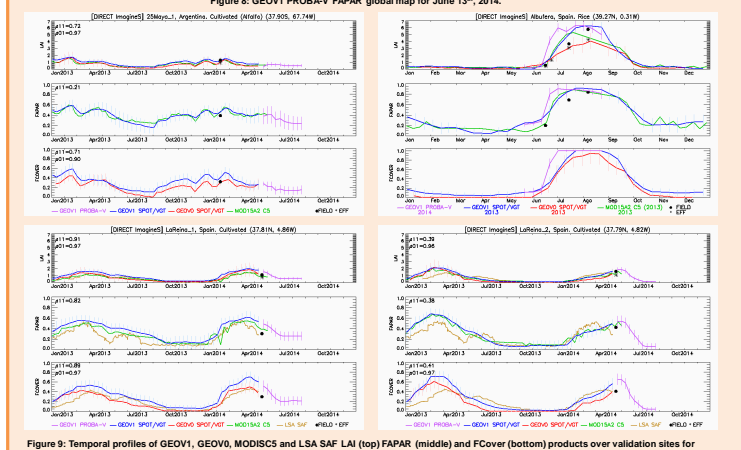


Figure 9: Temporal profiles of GEOV1, GEOV0, MODISCS and LSA SAF LAI (top) FAPAR (middle) and FCOVER (bottom) products over validation sites for 2013-2014 period. Vertical bars correspond to the uncertainties of GEOV1 and GEOV0 products. For the LAI, asterisk symbol represent LAIeff observation.

The aim is to contribute to the evolution and continuity of the Copernicus Global Land Service

- ImagineS is developing qualified processing lines able to process multi-sensor (Proba-V & Sentinel-3) data to generate global biophysical products at 300m resolution.
- ImagineS contributes to the collection of continuous ground data over a network of demo sites around the world and the upscaling using high resolution images.

#### SPOT/VGT DIRECT VALIDATION RESULTS

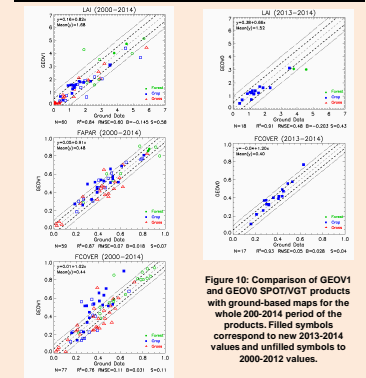


Figure 10: Comparison of GEOV1 and GEOV0 SPOT/VGT products with ground-based maps for the whole 200-2014 period of the products. Filled symbols correspond to new 2013-2014 values and unfilled symbols to 2000-2012 values.

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