LPVE23 - WORKSHOP ON LAND PRODUCT VALIDATION AND EVOLUTION

SENTINEL-3 BASED SURFACE ALBEDO PRODUCT FOR THE CONTINUITY OF COPERNICUS CLIMATE CHANGE SERVICE (C3S) DATA RECORDS.

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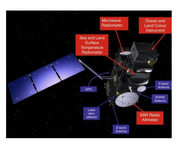
ABSTRACT

The aim of C3S is to supply reliable climate data in support of strategies to adaptation and mitigation to climate change, providing access to high-quality CDRs of atmospheric, marine and land ECVs (including global Earth Surface Albedo (SA) satellite-based products). The retrieval methodology and preliminary validation results for global estimates of SA based on Sentinel-3 observations for the C3S ECVs data (C3S SA v3.0) are presented.

The retrieval algorithm exploits the synergistic use of the OLCI and SLSTR, starting from the atmospherically corrected reflectances generated in the CGLS. The BRDF inversion module concludes the BRDF model parameters, which are transferred to the angular integration module in order to generate spectral albedo quantities for the selected OLCI and SLSTR bands. At the end, the spectral integration module generates broadband albedo quantities in three different broadband regions (visible, NIR and total shortwave). Our results have demonstrated the feasibility to estimate global fields of SA from Sentinel-3 observations, with similar quality of existing operational products. These Sentinel-3 based SA datasets will give the continuity to the existing C3S SA CDR, introducing improvements in terms of spatial resolution (300 m) and spectral information (9 spectral albedos) in contrast to previous datasets based AVHRR (4 km, 4 channels) and VGT instruments (1 km, 4 channels).

ALGORITHM OVERVIEW

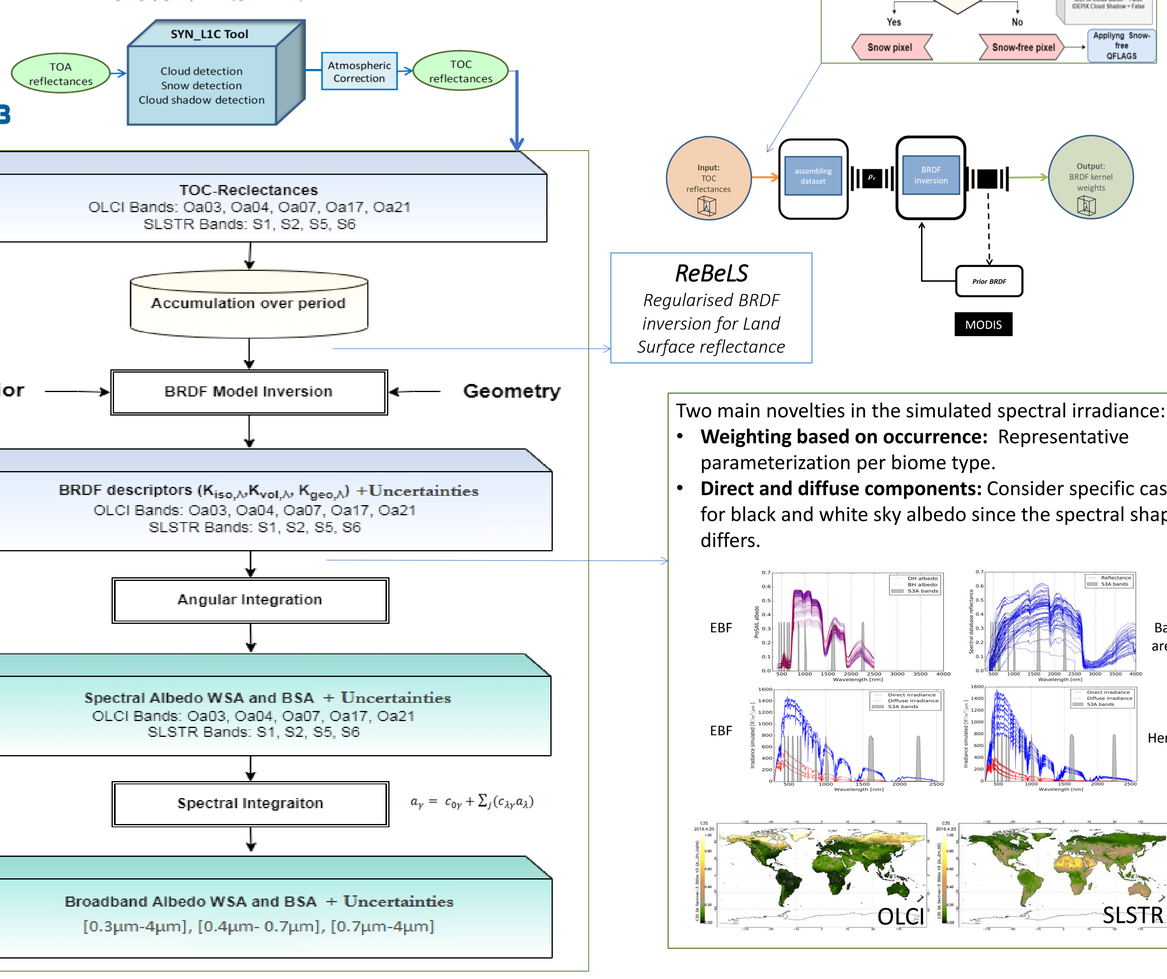
	OLCI					SLSTR			
Spectral band	Oa03	Oa04	Oa07	Oa17	Oa21	S1	S2	S5	S6
λ centre (nm)	442.5	490	620	865	1020	554.27	659.47	1613.4	2255.7
Width (nm)	10	10	10	20	40	19.26	19.25	60.68	50.15



sentinel-3

Copernicus Global Land Pre-processing chain

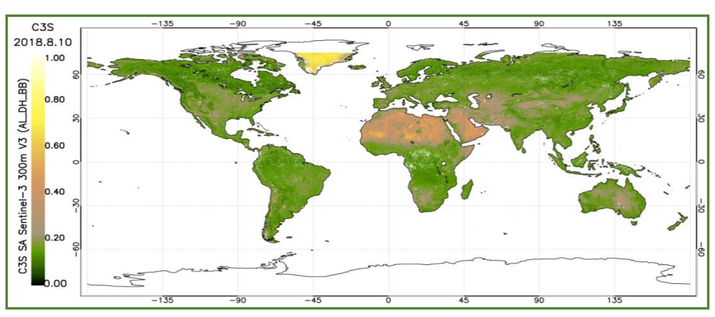
Providing bio-geophysical products of global land surface

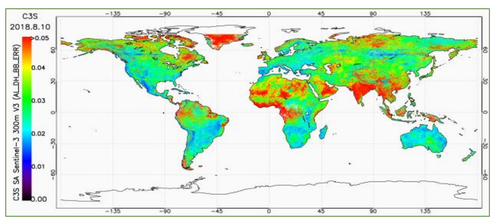


ReBeLS
Regularised BRDF inversion for Land Surface reflectance

Two main novelties in the simulated spectral irradiance:

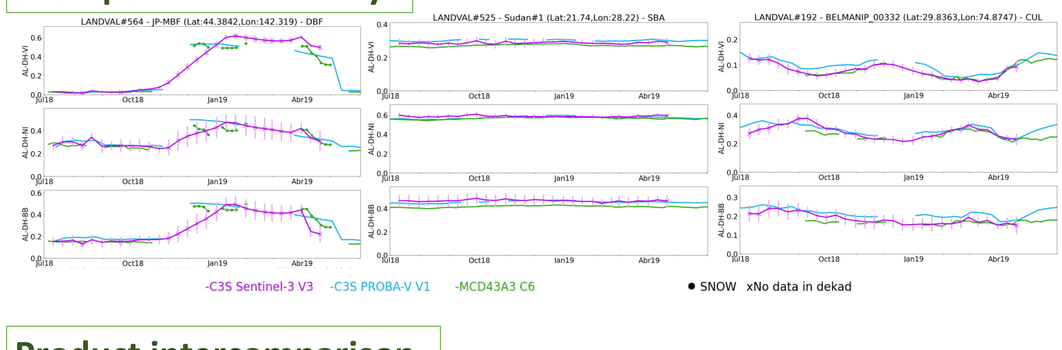
- **Weighting based on occurrence:** Representative parameterization per biome type.
- **Direct and diffuse components:** Consider specific cases for black and white sky albedo since the spectral shape differs.





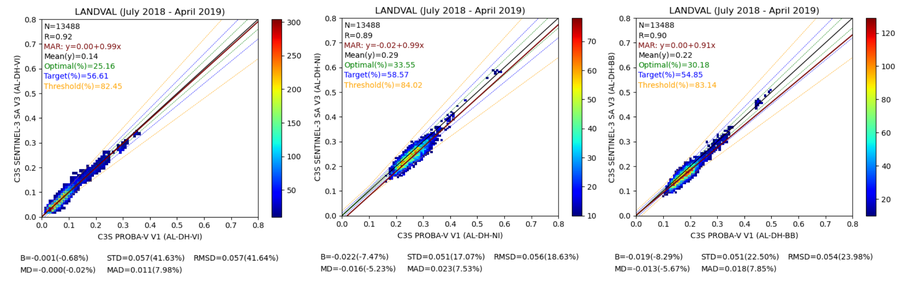
PRELIMINARY VALIDATION

Temporal Consistency

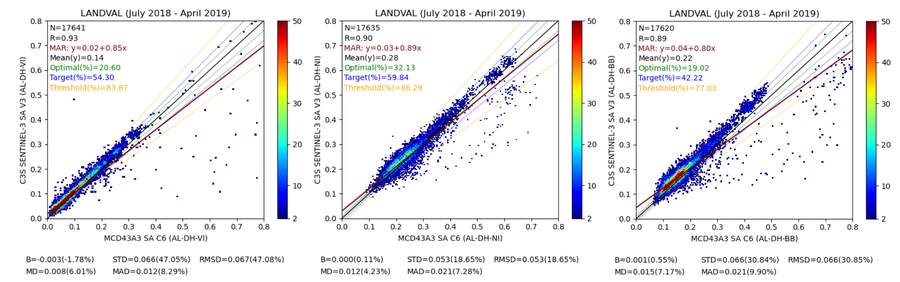


Product intercomparison

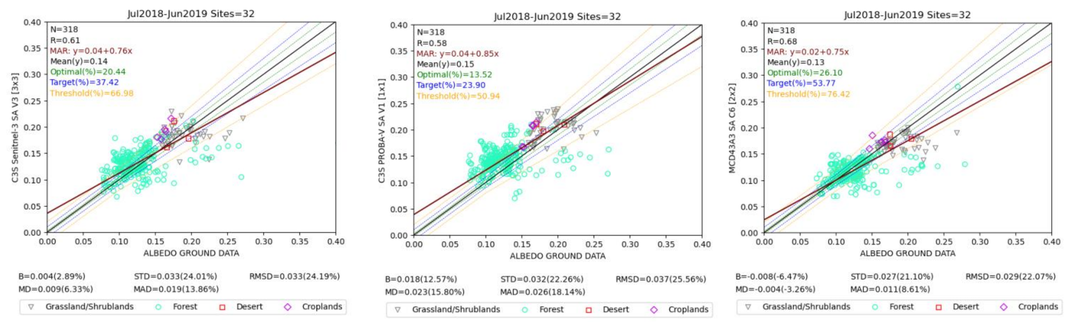
C3S Sentinel-3 SA v3.0 vs C3S PROBA-V v1.0



C3S Sentinel-3 SA v3.0 vs MCD43A3 C6



Direct validation



CONCLUSIONS

❖C3S CDR continuity is ensured thanks to the switch to Sentinel-3 SA v3.0 algorithm.

❖Preliminary validation following CEOS/WGCV LPV best practices over 10-months demonstration period (July 2018-April 2019) at global scale showed that C3S Sentinel-3 SA v3.0 reached overall good spatial and temporal consistency as compared to other satellite operational references (MCD43A3 C6 and C3S PROBA-V SA v1.0).

❖The comparison with ground data over 32 homogeneous stations shows similar results to the MCD43A3 C6 comparisons but opposite sign in differences (marginally positive in case of Sentinel-3), with accuracy of 0.005 (3.7%), precision of 0.016 (11.3%) and uncertainty of 0.032 (22.7%).

❖The main drawback is the underestimation of snow albedo values, due to the current limitation related to input data from the ESA Sentinel-3 mission (IdePix).

→ **REFERENCE:** **Sánchez-Zapero, J.**, Camacho, F., Martínez-Sánchez, E., Gorroño, J., León-Tavares, J., Benhadj, I., Toté, C., Swinnen, E., Muñoz-Sabater, J., 2023a. Global estimates of surface albedo from Sentinel-3 OLCI and SLSTR data for Copernicus Climate Change Service: Algorithm and preliminary validation. Remote Sens. Environ. 287, 113460. https://doi.org/10.1016/J.RSE.2023.113460

The data can be accessed through the C3S Climate data Store: https://cds.climate.copernicus.eu/

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