







S3 Product Notice - OLCI

Mission	S3A & S3B			
Sensor	OLCI			
Product	OL_2_LFR in NRT and NTC			
	OL_2_LRR in NRT and NTC			
Product Notice ID	S3.PN-OLCI-L2L.04			
Issue/Rev Date	16/12/2021			
Version	1.0			
Preparation	This Product Notice was prepared by the S3 Mission Performance Centre and by ESA experts			
Approval	ESA Mission Management			

Summary

This is a Product Notice related to S3A and S3B Ocean and Land Colour Instrument (OLCI) Level-2 Land products at Near Real Time (NRT) and Non Time Critical (NTC) timeliness.

The Notice describes the OLCI Level 2 current processing baseline, product and quality limitations, and product availability status.

Specific update for PB 2.79-A/1.57-B:

- The OLCI Global Vegetation Index (OGVI) product has been renamed, in agreement with the European Commission, according to its scientific definition: Green Instantaneous Fraction of Absorbed Photosynthetically Available Radiation (GIFAPAR)
- All variables containing uncertainty estimates associated to geophysical products have been renamed to better reflect their content: *var_err* is renamed as *var_unc*, where *var* is any geophysical product.

The content of the product is otherwise unchanged and remains fully consistent with the previous Processing Baseline.









Processing Baselines			
	S3A	S3B	
Processing Baseline	Processing Baseline: 2.79	Processing Baseline: 1.57	
IPFs version	OL_1 IPF version: 06.11	OL_1 IPF version: 06.11	
	OL_2 IPF version: 06.15	OL_2 IPF version: 06.15	
	PUG version: 03.41	PUG version: 03.41	

Current Operational Processing Baselines			
IPF	IPF / PB Version	Into operation since	
S3 OL1	06.11 / OLL1002.21.00	NRT mode: 18/11/2021 11:34 UTC NTC mode: 18/11/2021 11:34 UTC	
S3A OL2	06.15 / 2.79	NRT mode: 16/12/2021 9:30 UTC NTC mode: 16/12/2021 9:30 UTC	
S3B OL2	06.15 / 1.57	NRT mode: 16/12/2021 9:30 UTC NTC mode: 16/12/2021 9:30 UTC	
PUG	03.41	16/12/2021 9:30 UTC	









Status of the Processing Baselines

S₃A

The current Processing Baseline for Sentinel-3A OLCI Level-2 Land products is v2.79 as deployed in the Land Centre on 16 December 2021. For Level 1 product quality please refer to OLCI Level-1 Product Notice for the Processing Baseline 2.76-A and 1.54-B. Level 2 product quality status is described in the following section.

Level 2 Product Summary:

- Pixel classification and flagging
 - OLCI pixel classification, particularly cloud flagging, has been significantly improved since the first OLCI —A Level 2 land data by integrating a neural net trained with manually classified pixels and by revising the pixel classification logic. In general, the cloud flagging is clear sky conservative.
 - For building temporal or spatial synthesis, or working in unsupervised mode, it is recommended that the users exclude pixels which are flagged by at least one of the following flags, to exclude unreliable pixels for the individual products. All flags are available in the Level 2 product:
 - CLOUD
 - CLOUD AMBIGUOUS
 - CLOUD MARGIN
 - SNOW ICE
 - For OCTI: OTCI_fail or LQSF_OTCI_CLASS_CLSN
 - For GIFAPAR: GIFAPAR fail

Vegetation biophysical products

The core land product includes two vegetation biophysical products providing continuity of MERIS products:

• OLCI Green Instantaneous FAPAR (GIFAPAR): providing the Green Instantaneous Fraction of Absorbed Photosynthetically Active Radiation (FAPAR); this bio-geophysical product is essential to study the plant photosynthetic process, and it is often used in diagnostic and predictive models computing primary productivity of the vegetation canopies. In addition, this parameter is also an input for the estimation of assimilation of CO2 in vegetation. GIFAPAR ranges from 0-1. Validation of the GIFAPAR is on-going: The seasonal changes were assessed with products derived from the same algorithm, i.e. providing instantaneous green FAPAR, using third party instrument (MODIS); the results show high correlation of 0.96 with rmse equal to 0.07. Seasonality comparisons against









ground-based measurements, which provide only proxy values, have shown that OLCI FAPAR described well the seasonal changes over various types of crops and more ground-truth is under collection for validation purposes. Associated rectified channels over bright surface have been assessed over CEOS Libya site by looking at the temporal stability. Few remaining cloud shadows appear and a drop in both channels have been identified. Further studies will start to explain these changes.

- OLCI Terrestrial Chlorophyll Index (OTCI): providing indication of the content of Chlorophyll in the canopy, it is based on the heritage of MERIS Terrestrial Chlorophyll Index (MTCI). This index has several advantages: it is easily calculated and suitable for automation, it is strongly correlated with the Red-Edge Position (REP) and unlike REP, it is sensitive to high values of chlorophyll content. Information on canopy chlorophyll content is an important indication of plant health and photosynthetic capacity. OTCI ranges from 1-6.5. Validation of the OTCI is ongoing but results of several study sites among which is a campaign in the New Forest (UK) have shown a correlation of ca. 0.9 between upscaled Canopy Chlorophyll Content CCC and near-contemporaneous OLCI L2 products, giving confidence in the product. More validation work with additional in situ data is currently performed.
- Several planned campaigns will support the continuous validation efforts for both OLCI land products and build on campaigns performed in 2017 and 18.
- Both products have additional layers associated with errors and uncertainty. Initial validation shows good performance of both products over a range of vegetation types.

S₃B

The current Processing Baseline for Sentinel-3B OLCI Level-2 Land products is v1.57 as deployed in the Land Centre on 16 December 2021. For Level 1 product quality please refer to OLCI Level-1 Product Notice for the Processing Baseline 2.76-A and 1.54-B. Level 2 product quality status is described in the following section.

Level 2 Product Summary:

- Pixel classification and flagging
 - OLCI pixel classification, particularly cloud flagging, has been significantly improved since the first OLCI —A Level 2 land data by integrating a neural net trained with manually classified pixels and by revising the pixel classification logic. In general, the cloud flagging is clear sky conservative.
 - For building temporal or spatial synthesis, or working in unsupervised mode, it is recommended that the users exclude pixels which are flagged by at least one of the following flags, to exclude unreliable pixels for the individual products. All flags are available in the Level 2 product:









- CLOUD
- CLOUD AMBIGUOUS
- CLOUD MARGIN
- SNOW_ICE
- For OCTI: OTCI_fail or LQSF_OTCI_CLASS_CLSN
- For GIFAPAR: GIFAPAR_fail

Vegetation biophysical products

The core land product includes two vegetation biophysical products providing continuity of MERIS products:

- OLCI Green Instantaneous FAPAR (GIFAPAR): providing the Green Instantaneous Fraction of Absorbed Photosynthetically Active Radiation (FAPAR); this bio-geophysical product is essential to study the plant photosynthetic process, and it is often used in diagnostic and predictive models computing primary productivity of the vegetation canopies. In addition, this parameter is also an input for the estimation of assimilation of CO2 in vegetation. GIFAPAR ranges from 0-1. Validation of the GIFAPAR is on-going: The seasonal changes were assessed from measurements after 22/06/2018 with S3A products and measurements derived from the same algorithm, i.e. providing instantaneous green FAPAR, using third party instrument (MODIS); Both level and seasonality agree together with the exception of few outliers. Global daily benchmark starts between S3A and S3B using reduced resolution at global scale: The correlation coefficient and the root mean square deviation (RMSD) are equal to 0.94 and 0.07, respectively with a bias of 0.007. When using a moving spatial averaging window of 3x3 pixels to reduce the geolocation residual error the RMSD drops to 0.026 with a bias of 0.006. Further studies will start to confirm the results.
- OLCI Terrestrial Chlorophyll Index (OTCI): providing indication of the content of Chlorophyll in the canopy, it is based on the heritage of MERIS Terrestrial Chlorophyll Index (MTCI). This index has several advantages: it is easily calculated and suitable for automation, it is strongly correlated with the Red-Edge Position (REP) and unlike REP, it is sensitive to high values of chlorophyll content. Information on canopy chlorophyll content is an important indication of plant health and photosynthetic capacity. OTCI ranges from 1-6.5. OTCI-B validation is currently primarily based on intercomparisons with OTCI-A during the Sentinel-3 tandem phase and the MERIS climatology both of which have shown close agreement. Benchmark studies involving S3A and S3B for selected land cover show in average Normalised root mean square deviation (NRMSD) of 0.09, bias of 0.01 and absolute difference less than 1%. More validation work with additional in situ data is currently performed.









- Several planned campaigns will support the continuous validation efforts for both OLCI land products and build on campaigns performed in 2017 and 18.
- Both products have additional layers associated with errors and uncertainty. Initial validation shows good performance of both products over a range of vegetation types.

Known product quality limitations

Common to S3A and S3B

- Residual Level 2 flag limitations
 - OLCI Level 2 flags may still show limitations despite significant improvements and validations, including the cloud flag set: CLOUD, CLOUD AMBIGUOUS, CLOUD MARGIN. Some examples:
 - clouds may be falsely detected as SNOW ICE
 - camera boundaries may be noticeable

S3A

Nothing specific to S3A

S₃B

Nothing specific to S3B

Products Availability

- ☐ Copernicus Open Access Hub (https://scihub.copernicus.eu/), NRT and NTC
- ☐ Copernicus Online Data Access (https://coda.eumetsat.int/), NRT and NTC

Any other useful information

None









User Support

- Questions about OLCI L2 Land products can be asked to the Sentinel-3 User Support desk at:
 - o <u>eosupport@copernicus.esa.int</u>

References

- Product Notice OLCI L1, ref. S3.PN.OLCI-L1.04, version 1.0, dated on 12/12/2018
- Sentinel-3 Mission Requirements Traceability Document (MRTD), C. Donlon, EOP-SM/2184/CD-cd, 2011. https://sentinel.esa.int/documents/247904/1848151/Sentinel-3-Mission-Requirements-Traceability
- Product Data Format Specification OLCI Level 1 & 2 Instrument Products, Ref: S3IPF.PDS.002, Issue: 1.6, Date: 29/06/2015

https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-olci/document-library

S3 OLCI Land User Handbook,

https://sentinel.esa.int/documents/247904/4598066/Sentinel-3-OLCI-Land-Handbook.pdf

End of the Product Notice