



## S3 Product Notice – OLCI

<b>Mission</b>	S3A & S3B	
<b>Sensor</b>	OLCI	
<b>Product</b>	OL_1_EFR in NRT and NTC OL_1_ERR in NRT and NTC	
<b>Product Notice ID</b>	S3.PN-OLCI-L1.09	EUM/OPS-SEN3/DOC/22/1276638
<b>Issue/Rev Date</b>	20/01/2022	
<b>Version</b>	1.0	
<b>Preparation</b>	This Product Notice was prepared by the Optical Mission Performance Cluster and by ESA and EUMETSAT experts	
<b>Approval</b>	Joint ESA-EUM Mission Management	

### Summary

This Product Notice addresses both Sentinel-3A and -3B Ocean and Land Colour Imager (OLCI-A and OLCI-B) Level-1B processing baseline OL\_\_L1\_.002.22.00 deployed on 20/01/2022. The Notice is applicable to Near Real Time (NRT) and Non-Time Critical (NTC) timeliness.

The Notice describes the current Level-1B status, the processing baseline, the product quality and known limitations for both OLCI-A and OLCI-B.

The processor changes do not have immediate impact on OLCI Level-1B products.

The changes mainly address processing configuration traceability: the processing baseline ID is now reported in the products' metadata. The new OLCI Processing Baseline ID has the following format:

**OL\_\_L1\_.xxx.yy.zz**, where

- xxx : baseline collection,
- yy : minor changes in IPF or in static ADF (starting from zero for a new baseline collection),
- zz: changes in LO or processing parametrization which are not expected to affect the quality of the products.

A software issue has also been corrected, affecting geolocation of out-of-swath pixels in the vicinity of North pole. Out-of-swath pixels, not filled with any georeferenced instrument measurement, are georeferenced by interpolation from surrounding Tie Points, and the interpolation scheme (bilinear) was not suited to very high latitude (higher than 89.5 degrees). Pixels bearing measurements are georeferenced independently and were not affected by the corrected issue.



### Processing Baseline

S3A and S3B	
<b>Processing Baseline</b>	<ul style="list-style-type: none"> <li>Processing Baseline: OL__L1_.002.22.00</li> </ul>
<b>IPFs version</b>	<ul style="list-style-type: none"> <li>OL_1 IPF version: 06.12</li> </ul>
	<ul style="list-style-type: none"> <li>PUG version: 03.43</li> </ul>

### Current Operational Processing Baselines

IPF	IPF / PB Version	In the operation since
OL1	06.12 / OL__L1_.002.22.00	<p><b>Land Centres:</b></p> <p>NRT mode: 20/01/2022 10:05 UTC            NTC mode: 20/01/2022 10:05 UTC</p> <p><b>Marine Centre:</b></p> <p>NRT mode: 20/01/2022 09:15 UTC            NTC mode: 20/01/2022 09:15 UTC</p>
PUG	03.43	<p><b>Land Centres:</b></p> <p>20/01/2022 10:05 UTC</p> <p><b>Marine Centre:</b></p> <p>18/01/2022 11:35 UTC</p>



## Status of the Processing Baselines

### S3A

The current processing baseline for Sentinel-3A OLCI Level-1B products is OL\_\_L1\_.002.22.00. The baseline was deployed on 20/01/2022 at the Land and Marine Centres.

This Processing Baseline includes IPF updates without immediate impact on OLCI L1B products: in order to ease the traceability of S3 products, the processing baseline number is now provided in the manifest file and in the global attributes of each netCDF file (see example below).

In the manifest file:

```
<metadataObject ID="generalProductInformation" classification="DESCRIPTION" category="DMD">
  <metadataWrap mimeType="text/xml" vocabularyName="Sentinel-SAFE" textInfo="General Product Information">
    <xmlData>
      <sentinel3:generalProductInformation>
        <sentinel3:productName>S3A_OL_1_EFR____20200526T101330_20200526T101340_20211124T151300_0009_058_336_
        <sentinel3:productType>OL_1_EFR____</sentinel3:productType>
        <sentinel3:timeliness>NT</sentinel3:timeliness>
        <sentinel3:baselineCollection>002</sentinel3:baselineCollection>
        <sentinel3:processingBaseline>OL__L1_.002.22.00</sentinel3:processingBaseline>
        <sentinel3:creationTime>20211124T151300</sentinel3:creationTime>
        <sentinel3:productSize>37911822</sentinel3:productSize>
      </sentinel3:generalProductInformation>
    </xmlData>
  </metadataWrap>
</metadataObject>
```

In the netCDF files global attributes:

```
// global attributes:
» » :netCDF_version = "4.2 of Mar 26 2020 15:01:34 $" ;
» » :product_name = "S3A_OL_1_EFR____20200526T101330_20200526T101340_20211124T151300_0009_058_336_
» » :title = "OLCI Level 1b Product, Radiance Oa04 Data Set" ;
» » :institution = "LR1" ;
» » :source = "IPF-OL-1-E0 06.11" ;
» » :history = " " ;
» » :references = "S3IPF PDS 004.1 - i2r4 - Product Data Format Specification - OLCI Level 1, S3IP
iel 1" ;
» » :contact = "s3ome@acri-st.fr" ;
» » :creation_time = "2021-11-24T15:13:00Z" ;
» » :resolution = "[ 270 294 ]" ;
» » :absolute_orbit_number = 22254U ;
» » :start_time = "2020-05-26T10:13:30.005185Z" ;
» » :stop_time = "2020-05-26T10:13:39.817422Z" ;
» » :processing_baseline = "OL__L1_.002.22.00" ;
» » :comment = " " ;
» » :ac_subsampling_factor = 64US ;
» » :al_subsampling_factor = 1US ;
```



The quality status of this processing baseline is as follows:

### Geometric Calibration

- OLCI-A geolocation accuracy meets the mission requirements in terms of global RMS value (0.5 pixel according to [S3 MRTD, 2011](#)) with a RMS performance below 0.3 pixel. Validation of the Geometric Calibration, using Landsat ground control points on current datasets (Q1 2021) shows the following geolocation accuracy per camera:

Camera Module	Georeferencing Biases (pixels)	
	Across Track	Along Track
1	-0.05	-0.01
2	-0.04	-0.07
3	-0.01	-0.15
4	-0.03	-0.16
5	-0.05	-0.13

The misregistration at the interfaces of each camera is below 0.1 pixels.

### Spectral Calibration

- OLCI-A spectral model is based on a combination of pre-launch spectral characterisations and in-flight commissioning calibrations. The model meets the mission requirements ([S3 MRTD, 2011](#)), based on in-flight spectral measurements. OLCI-A spectral response information and datasets are provided online ([S3 OLCI SRF, 2016](#)).
- The in-flight spectral measurements also show that OLCI-A spectral response has been evolving over time by up to 0.3 nm compared to the defined centre wavelengths. Therefore, OLCI spectral evolution should be taken into account for specific applications, particularly those using the O<sub>2</sub>-A absorption bands. Further information and user resources to correct for OLCI spectral evolution are described below in the section on 'Known product quality limitations'.

### Radiometric Calibration

- Radiometric validation results demonstrate that OLCI-A absolute radiometric calibration has a positive bias of about 2 to 3 percent throughout all bands, with the exception of band Oa21 (1020nm) at about 6 percent, OLCI being too bright. Actions are in place to achieve OLCI radiometric compliancy (2% absolute accuracy for bands ≤ 900 nm, 5% > 900 nm, [S3 MRTD, 2011](#)).
- OLCI-A Radiometric Gain Model is based on the set of in-flight radiometric calibrations ending on 03/10/2021. It includes radiometric gain coefficients at a reference date and a long-term evolution



model. The set of radiometric gain coefficients used to derive both the Reference Gains and the Evolution Model have been computed using up-to-date geometric and spectral calibration, instrument settings, an upgraded diffuser BRDF model based on in-flight data, and diffuser ageing (browning) correction. The Radiometric Model is continuously monitored against new Radiometric Calibration acquisitions.

### S3B

The current processing baseline for Sentinel-3B OLCI Level-1B products is OL\_\_L1\_.002.22.00. The baseline was deployed on 20/01/2022 at the Land and Marine Centres.

This Processing Baseline includes IPF updates without immediate impact on OLCI L1B products: in order to ease the traceability of S3 products, the processing baseline number is now provided in the manifest file and in the global attributes of each netCDF file (see example below).

In the manifest file:

```
<metadataObject ID="generalProductInformation" classification="DESCRIPTION" category="DMD">
  <metadataWrap mimeType="text/xml" vocabularyName="Sentinel-SAFE" textInfo="General Product Information">
    <xmlData>
      <sentinel3:generalProductInformation>
        <sentinel3:productName>S3A_OL_1_EFR____20200526T101330_20200526T101340_20211124T151300_0009_058_336_
        <sentinel3:productType>OL_1_EFR____</sentinel3:productType>
        <sentinel3:timeliness>NT</sentinel3:timeliness>
        <sentinel3:baselineCollection>002</sentinel3:baselineCollection>
        <sentinel3:processingBaseline>OL_L1_.002.22.00</sentinel3:processingBaseline>
        <sentinel3:creationTime>20211124T151300</sentinel3:creationTime>
        <sentinel3:productSize>37911822</sentinel3:productSize>
      </sentinel3:generalProductInformation>
    </xmlData>
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>> >> :title = "OLCI Level 1b Product, Radiance Oa04 Data Set" ;
>> >> :institution = "LR1" ;
>> >> :source = "IPF-OL-1-E0 06.11" ;
>> >> :history = " " ;
>> >> :references = "S3IPF PDS 004.1 - i2r4 - Product Data Format Specification - OLCI Level 1, S3IP
iel 1" ;
>> >> :contact = "s3ome@acri-st.fr" ;
>> >> :creation_time = "2021-11-24T15:13:00Z" ;
>> >> :resolution = "[ 270 294 ]" ;
>> >> :absolute_orbit_number = 22254U ;
>> >> :start_time = "2020-05-26T10:13:30.005185Z" ;
>> >> :stop_time = "2020-05-26T10:13:39.817422Z" ;
>> >> :processing_baseline = "OL_L1_.002.22.00" ;
>> >> :comment = " " ;
>> >> :ac_subsampling_factor = 64US ;
>> >> :al_subsampling_factor = 1US ;
```



The quality status of this processing baseline is as follows:

### Geometric calibration

- OLCI-B geolocation accuracy meets the mission requirements in terms of global RMS value (0.5 pixel according to [S3 MRTD, 2011](#)) with a RMS performance below 0.3 pixel. Validation of the current Geometric Calibration, using Landsat ground control points on current datasets (Q1 2021) shows the following geolocation accuracy per camera:

Camera Module	Georeferencing Biases (pixels)	
	Across Track	Along Track
1	0.01	-0.02
2	0.01	-0.04
3	0.02	-0.05
4	0.03	-0.03
5	0.01	-0.07

The misregistration at the interfaces of each camera is below 0.2 pixel.

### Spectral calibration information

- The OLCI-B spectral model is based on the pre-launch spectral characterisation. The model meets the mission requirements ([S3 MRTD, 2011](#)), based on in-flight spectral measurements. OLCI-B spectral response information and datasets are provided online ([S3 OLCI SRF, 2016](#)).
- The in-flight spectral measurements also show that OLCI-B spectral response has been evolving over time by up to 0.25 nm compared to the defined centre wavelengths. Therefore, OLCI spectral evolution should be taken into account for specific applications, particularly those using the O<sub>2</sub>-A absorption bands. Further information and user resources to correct for OLCI spectral evolution are described below in the section on 'Known product quality limitations'.

### Radiometric calibration information

- Radiometric validation results demonstrate that OLCI-B provides measurements within the mission requirements of < 2% for the spectral range  $\leq 900\text{nm}$  ([S3 MRTD, 2011](#)). OLCI-B radiometry is comparable to MERIS and by about 1-2% lower than OLCI-A (OLCI-A has a bright bias). Similarly to OLCI-A, the 1020 nm band is subject to a bright bias of about 4%.

OLCI-B Radiometric Gain Model is based on the set of in-flight radiometric calibrations ending on 16/09/2021. It includes radiometric gain coefficients at a reference date and a long-term evolution model. The set of radiometric gain coefficients used to derive both the Reference Gains and the



Evolution Model has been computed using up-to-date geometric and spectral calibration, instrument settings and the upgraded diffuser BRDF model based on in-flight data. Correction for diffuser ageing (browning) is now included. The Radiometric Model is continuously monitored against new Radiometric Calibration acquisitions.

### Known product quality limitations

#### Common to S3A and S3B

#### Spectral Calibration

In-flight spectral measurements show that OLCI spectral response has been evolving over time compared to the defined centre wavelengths. OLCI spectral evolution should be taken into account for specific applications using the O<sub>2</sub>-A absorption bands around 760 nm, i.e. bands Oa13, 14 and 15. Spectral evolution may also be important for additional bands: water vapour absorption bands Oa19 and 20; blue Rayleigh bands Oa01 and 2 at 400 and 412.5 nm; chlorophyll fluorescence bands; red-edge bands around 750 nm. Technical Notes, Look-up-Tables, python code and Jupyter Notebook scripts are available for users to correct for the spectral evolution. Two types of corrections are made available:

- **Spectral wavelength** correction is available from [S3 OLCI SRF, 2021](#) and it allows to calculate the best estimate of centre wavelengths, bandwidth and in-band solar irradiance for all OLCI bands (Oa01 – Oa21) and all pixels through the mission at a given absolute orbit number. Note that a SRF adjustment must be performed as well.
- **Top Of the Atmosphere (TOA) radiance** correction for the O<sub>2</sub>-A absorption bands only (also called “O<sub>2</sub>-A harmonization”) is also available from [S3 OCTPO2, 2021](#). A related correction is likewise implemented as a plugin in the SNAP toolbox.

#### Radiometric Calibration

- Anomalously low radiances occur in some bands for pixels at the edge of saturated areas, and the radiances do not correspond to geophysical expectations. The issue is present over bright clouds for both OLCI-A and OLCI-B instruments. All OLCI bands can be affected but for any single scene, if the issue occurs, it is limited to a few bands. The anomaly is described in a dedicated document ([S3MPC.ACR.MEM.087, 2020](#)).
- Vertical striping at the first 100 pixels at camera interfaces in bands Oa19 and Oa20, known as periodic noise, is now mitigated by using the most recent dark signal measurements. Residual periodic noise may be occasionally present.
- Single anomalous pixels, in particular in the region of the South Atlantic Anomaly, may occur due to prompt particle events.

#### Straylight

- Verification and update of the OLCI straylight correction performance is ongoing.



## Flags

- Accuracy of OLCI L1B product flags is under assessment. No issue has been identified so far.

## Per-pixel uncertainty estimates

- Uncertainty estimates for OLCI radiances for all bands are not yet available in the products.

### S3A

- Nothing specific to S3A

### S3B

## Spatial continuity at camera interfaces for OLCI-B L1 and L2 products

- Apparent spatial discontinuities of up to 4 pixels have been identified at the interface between cameras 2 and 3 of OLCI-B. The discontinuities have been verified as an artefact of the spatial regridding process where georeferencing of pixels still remains correct. In other words, specific spatial features may appear twice, on each side of the cameras interface in the image grid, but their respective geolocation is extremely close (ground distances below 1 meter in the verification test scenes). The root cause for this issue has been found as a shortcoming of the spatial regridding process and a correction is under study. This issue does not affect OLCI-A, even if it goes through the same spatial regridding process, because of a better continuity between adjacent cameras.

## Products Availability

- Copernicus Open Access Hub (<https://scihub.copernicus.eu/>), NRT and NTC
- Copernicus Online Data Access (CODA) (<https://coda.eumetsat.int/>), NRT and NTC
- EUMETCast (<https://eoportal.eumetsat.int/>), NRT
- EUMETSAT Data Centre (<https://eoportal.eumetsat.int/>), NRT and NTC

Product	EUMETCast	ODA*	CODA	EUMETSAT Data Centre
L1 RR	NRT	NRT, NTC	NRT, NTC	NRT, NTC
L1 FR	-	NRT, NTC	NRT, NTC	NRT, NTC

\* ODA is available only for Copernicus Services and S3VT users





### Any other useful information

- For further details on OLCI L1B status and validation results, refer to S3 OLCI Cyclic Quality Reports available from <https://sentinels.copernicus.eu/web/sentinel/technical-guides/sentinel-3-olci/data-quality-reports>.

### User Support

- Questions about OLCI products can be asked to the Sentinel-3 User Support desk at:
  - [eosupport@copernicus.esa.int](mailto:eosupport@copernicus.esa.int)
  - [ops@eumetsat.int](mailto:ops@eumetsat.int)

### References

- MRTD: Sentinel-3 Mission Requirements Traceability Document, C. Donlon, EOP-SM/2184/CD-cd, 2011, <https://sentinel.esa.int/documents/247904/1848151/Sentinel-3-Mission-Requirements-Traceability>
- S3 OLCI SRF: Sentinel-3 OLCI-A and OLCI-B spectral response functions (SRF), Sentinel 3 CalVal Team and Mission Performance Centre, 2016 / 2021  
<https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-3-olci/olci-instrument/spectral-response-function-data>
- S3 OCTPO2: Cloud Top Pressure development from S3 OLCI, 2021, <https://www.eumetsat.int/S3-OLCI-CTP>
- OLCI anomalous spectral samples - user note, S3MPC.ACR.MEM.087, 2020
  - <https://www.eumetsat.int/media/47581>
- Product Data Format Specification – OLCI Level 1 Instrument Products, Ref: S3IPF.PDS.004.1, Issue: 2.2, Date: 09/10/2017
  - <https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-olci/document-library>
  - <https://www.eumetsat.int/media/38641>
- S3 OLCI Cyclic Quality Reports, Ref. S3MPC.ACR.PR, issued monthly, <https://sentinels.copernicus.eu/web/sentinel/technical-guides/sentinel-3-olci/data-quality-reports>
- S3 OLCI Land User Handbook, <https://sentinel.esa.int/documents/247904/4598066/Sentinel-3-OLCI-Land-Handbook.pdf>
- S3 OLCI Marine User Handbook, <https://www.eumetsat.int/media/45743>



### Static ADFs updated

#### S3A

- S3A\_OL\_1\_CAL\_AX\_20211027T000000\_20991231T235959\_20211029T120000\_\_\_\_\_MPC\_O\_AL\_025.SEN3

#### S3B

- S3B\_OL\_1\_CAL\_AX\_20211027T000000\_20991231T235959\_20211029T120000\_\_\_\_\_MPC\_O\_AL\_015.SEN3

***End of the Product Notice***