



## Sentinel-3 Product Notice – SLSTR Level-2 Sea Surface Temperature

<b>Mission</b>	Sentinel-3A & Sentinel-3B	
<b>Sensor</b>	SLSTR-A & SLSTR-B	
<b>Product</b>	Level 2 Sea Surface Temperature	
<b>Product Notice ID</b>	EUM/OPS-SEN3/DOC/19/1063159	S3.PN-SLSTR-L2M.002
<b>Issue/Rev Date</b>	15/01/2020	
<b>Version</b>	1.1	
<b>Preparation</b>	This Product Notice was prepared by EUMETSAT with assistance from the S3 Mission Performance Centre.	
<b>Approval</b>	EUMETSAT Mission Management	

Summary
<p>This is a Product Notice (PN) for Sentinel-3A and -3B Sea and Land Surface Temperature Radiometer (SLSTR-A and SLSTR-B) Level-2 Sea Surface Temperature (SST) products generated with Processing Baseline (PB) 2.61 (-A) and 1.33 (-B) deployed on 15/01/2020. It is applicable to both Near Real Time (NRT) and Non Time Critical (NTC) timeliness.</p> <p>The Notice describes the Level-2 current status, the processing baseline, the product quality and known limitations for both SLSTR-A and SLSTR-B.</p> <p>The main changes are an update to the quality level assignment to flag data affected by spacecraft manoeuvres and an adjustment to the per pixel time in the SL_2_WST product to account for the offset of the first valid pixel within a scan.</p> <p>Note: A major change to the SLSTR Level-1 Processing Baseline accompanies this update to Level-2. The overall quality of the Level-2 SST is not affected by the changes at Level-1.</p>

**Processing Baseline**

	<b>S3A</b>	<b>S3B</b>
<b>Processing Baseline</b>	<ul style="list-style-type: none"> <li>Processing Baseline: 2.61</li> </ul>	<ul style="list-style-type: none"> <li>Processing Baseline: 1.33</li> </ul>
<b>IPFs version</b>	<ul style="list-style-type: none"> <li>SL_2 IPF version: 06.18</li> <li>PUG version: 3.37</li> </ul>	

**Current Operational Processing Baselines**

<b>IPF</b>	<b>IPF Version</b>	<b>Into operations since</b>
S3A SL2	06.18	NRT mode: 15/01/2020 11:36 UTC NTC mode: 15/01/2020 11:36 UTC
S3B SL2	06.18	NRT mode: 15/01/2020 11:36 UTC NTC mode: 15/01/2020 11:36 UTC
PUG	3.37	NRT mode: 15/01/2020 11:36 UTC NTC mode: 15/01/2020 11:36 UTC



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### Status of the Processing Baseline

This PN covers operational SLSTR-A & SLSTR-B Level-2 Sea Surface Temperature products generated using PB 2.61 and PB 1.33, respectively. These Level-2 products are generated from SLSTR-A and SLSTR-B Level-1 products using PB 2.59 and 1.31, respectively. The baselines were deployed in the marine processing centre on 15/01/2020 for both SLSTR-A and SLSTR-B.

#### Level 1 Products:

##### Geometric Calibration

- SLSTR-A & SLSTR-B nadir and oblique view geolocation accuracy meet the mission requirements (0.5 pixel as per S3 MRTD, 2011).
- The estimated geometric validation for SLSTR-A and SLSTR-B is within 0.1 pixel in nadir view along and across track and in oblique view across track.
  - Smaller offset (still within requirements) is observed in oblique view along track (~0.2 pix) for both satellites.

##### TIR Radiometric Calibration

- SLSTR-A & SLSTR-B TIR radiometric accuracy meets the mission requirements (S3 MRTD, 2011).

#### Level 2 Products:

##### SST retrieval algorithm (WST)

- The uncertainties of individual pixel clear-sky SST meet mission requirements (better than  $\pm 0.3$  K) for all retrievals for Quality Level 5 data.
- The current algorithm implementation interpolates SST coefficients to the tie point grid before the image grid.
- SLSTR-B is currently using SST retrieval coefficients for SLSTR-A owing to the high degree of commonality of their spectral response functions. Dedicated SLSTR-B coefficients will be deployed in a future update.
- SLSTR-B SSTs have been harmonised to SLSTR-A via the SSES-bias correction.

### Known Product Quality Limitations

The SLSTR-A and SLSTR-B Level-1b Processing Baselines applicable to this Product Notice, 2.59 and 1.31 respectively, have the following known limitations relevant to Sea Surface Temperature. All limitations are inherited from the previous Processing Baseline (covered by Product Notice S3.PN-SLSTR-L2M.001).

##### S7, S8, S9 co-registration

- A small sub-pixel mis-alignment has been observed between S7 and co-registered S8/S9 pixels (~250 m for SLSTR-A and ~120 m for SLSTR-B).
- For SST, the impact is still being assessed but is estimated to be very small ( $\ll 0.1$  K) and less than any uncertainty introduced by errors in the geolocation calibration model.



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### **Bayesian Cloud Screening**

- A cloud mask using Bayes theorem to identify clear sky scenes is now used for SST processing. Validation of the cloud mask indicates an overall accuracy of 90%. Although a significant improvement compared to the previous basic cloud mask, some residual issues have been identified:
  - The false alarm rate is higher than would be desired indicating some over-flagging of clear sky as cloud.
  - The Bayesian cloud mask is sensitive to ocean fronts resulting in over-flagging along the front itself.
  - The Bayesian cloud mask is sensitive to surface reflectance resulting in over-flagging in regions of upwelling and coastal zones.
- The Bayesian cloud mask is provided as a probability (0 – 1) in the SLSTR WST files. A threshold of 0.1 (i.e. values less than) is used to identify clear sky pixels and for assigning the WST Quality Levels. However, users may wish to try different thresholds in their regions of interest by using the provided probabilities.

### **Differences between NRT and NTC products**

- There are small expected differences between NRT and NTC products due to the regridding algorithm.

**The SLSTR-A and SLSTR-B Level 2 SST Processing Baselines applicable to this Produce Notice, 2.61 and 1.33 respectively, have the following known limitations. All limitations are inherited from the previous Processing Baseline (covered by Product Notice S3.PN-SLSTR-L2M.001).**

### **SST retrieval**

- The SST retrieval coefficients for nadir-only cases (N2 and N3) require further optimisation.
- The SST retrieval coefficients have been updated to adjust for inter-algorithm biases between the different SST algorithm types (N2, N3, D2 and D3). However, small offsets may still be most noticeable at the edges of the oblique-view where the retrieval changes between combined-view and single-view.
- It is recommended to only use the dual-view part of the SLSTR swath for reference SST applications.

### **WST theoretical uncertainties**

- The SST theoretical uncertainties are still preliminary and require further optimisation. Small offsets will be seen between the different SST algorithm types (N2, N3, D2 and D3). These offsets will be most noticeable at the edges of the oblique-view where the retrieval changes between combined-view and single-view.

### **WST SSES bias and standard deviation**

- The WST SSES bias and standard deviation values have been updated for this release. Values are provided for each retrieval and Quality Level. Users are reminded to apply the SSES bias before



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using the data. The SSES bias and standard deviation values will be refined in future updates. In particular, the SSES for Quality Levels lower than 5 are not currently well prescribed.

### WST quality levels

- For the best quality sea surface temperature observations, it is recommended to use only Quality Level 5 data. However, users should never use Quality Level 4 D2 or D3 data.
- User applications that can accept lower quality data may wish to use data with Quality Level lower than 5 or apply their own threshold on the Bayesian cloud probability (see later). However, users should never use Quality Level 4 D2 or D3 data.
- Data affected by spacecraft manoeuvres are now set to Quality Level 3, so they are no longer used as best quality. However, users using Quality Level 3 data may wish to use l2p\_flag bit 11, pointing, to remove this data from their application.

### WST S7, S8, and S9 NeDT values

- The pixel level NeDT values for channels S7, S8 and S9 provided in the WST display small pixel to pixel variability owing to the instrument design. Each of the channels has two detectors, with each detector having two integrators (for S8 and S9). A checkerboard pattern is seen that varies every 20 rows (or 120 instrument scans), which corresponds to the calibration averaging window used to calculate the gains and offsets for each detector. Occasional missing values in the scanline pattern.

### WST inland water

- SSTs and auxiliary fields are provided for inland water bodies as well as open ocean. These values should be considered very preliminary awaiting further validation. Please use l2p\_flags (bit 4, lake) to remove all inland pixels if not required. Note that bit 5, river, is not yet utilized and rivers are currently masked as lakes.

## Products Availability

- Copernicus Online Data Access (<https://codata.eumetsat.int/>), NRT and NTC
- EUMETCast (<https://eoportal.eumetsat.int/>), NRT
- EUMETSAT Data Centre (<https://eoportal.eumetsat.int/>), NRT and NTC
- FTP server address login: login password: password
- Other

Product	EUMETCast	ODA*	CODA**	EUMETSAT Data Centre
L2 SST	NRT	NRT, NTC	NRT, NTC	NRT, NTC

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

\*\* CODA is the service Copernicus Online Data Access and is available to all users



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### SLSTR Collection 3

The SLSTR-A and -B SST data covered by this PN are part of SLSTR SST Collection 003. The SLSTR collection number is included in the SAFE format filename. Reprocessed NTC products are distinguished from operational NTC products by the letter R instead of the letter O in the platform field in the SLSTR-A SAFE format filename. The user is referred to the SLSTR Marine Product Handbook for further information.

Note: SLSTR L1 Collection has been increased to 004 due to the significant changes in L1 product. AS these die not affect the SLSTR SST products the SST Collection number remains at 003.

#### SLSTR-A->

To form a consistent Collection 003 SST dataset for SLSTR-A users are advised to use operational NTC timeliness data along with the reprocessed data:

#### NTC time period and first/last products from each processing baseline

#### Product Notice

##### **18/04/2016 - 05/04/2018** (first/last R-NTC products):

S3A\_SL\_2\_WST\_\_\_\_20160418T235716\_20160419T013515\_20180927T170710\_5878\_003\_144\_\_\_\_\_MR1\_R\_NT\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20180404T225043\_20180405T000012\_20180929T080421\_4168\_029\_343\_\_\_\_\_MR1\_R\_NT\_003.SEN3

S3A PN-SLSTR-L2M-  
**05** - i1r0 - SLSTR  
L2M

##### **04/04/2018 - 01/08/2018** (first/last O-NTC products):

S3A\_SL\_2\_WST\_\_\_\_20180404T225052\_20180405T003151\_20180406T073955\_6059\_029\_343\_\_\_\_\_MAR\_O\_NT\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20180731T233157\_20180801T011256\_20180802T102422\_6059\_034\_101\_\_\_\_\_MAR\_O\_NT\_002.SEN3

S3A PN-SLSTR-L2M-  
**03** - i1r0 - SLSTR  
L2M

##### **01/08/2018 - 11/03/2019** (first O-NTC product):

S3A\_SL\_2\_WST\_\_\_\_20180801T011256\_20180801T025355\_20180802T183608\_6059\_034\_102\_\_\_\_\_MAR\_O\_NT\_002.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20190311T001649\_20190311T015748\_20190312T102049\_6059\_042\_187\_\_\_\_\_MAR\_O\_NT\_003.SEN3

S3A PN-SLSTR-L2M-  
**04** - i1r0 - SLSTR  
L2M

##### **11/03/2019 - 13/01/2020** (first/last O-NTC product):

S3A\_SL\_2\_WST\_\_\_\_20190311T015748\_20190311T033848\_20190312T114245\_6059\_042\_188\_\_\_\_\_MAR\_O\_NT\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20200113T135945\_20200113T154044\_20200115T233816\_6059\_053\_352\_\_\_\_\_MAR\_O\_NT\_003.SEN3

S3 PN-SLSTR-L2M-  
**01** - i1r1 - SLSTR  
L2M

##### **13/01/2020 - onwards** (first O-NTC product):

S3A\_SL\_2\_WST\_\_\_\_20200113T154044\_20200113T172143\_20200116T030756\_6059\_053\_353\_\_\_\_\_MAR\_O\_NT\_003.SEN3

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If users prefer to use NRT timeliness to complete their SLSTR-A Collection 003 record, they should use the following operational NRT products:

#### NRT time period and first/last products from each processing baseline

#### Product Notice

##### **18/04/2016 - 05/04/2018** (first/last R-NTC products):

S3A\_SL\_2\_WST\_\_\_\_20160418T235716\_20160419T013515\_20180927T170710\_5878\_003\_144\_\_\_\_\_MR1\_R\_NT\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20180404T225043\_20180405T000012\_20180929T080421\_4168\_029\_343\_\_\_\_\_MR1\_R\_NT\_003.SEN3

S3A PN-SLSTR-L2M-  
**05** - i1r0 - SLSTR  
L2M

##### **04/04/2018 - 02/08/2018** (first/last O-NRT product):

S3A\_SL\_2\_WST\_\_\_\_20180404T235806\_20180405T000106\_20180405T015916\_0179\_029\_344\_2520\_MAR\_O\_NR\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20180802T080759\_20180802T081059\_20180802T103929\_0179\_034\_121\_0720\_MAR\_O\_NR\_002.SEN3

S3A PN-SLSTR-L2M-  
**03** - i1r0 - SLSTR  
L2M

##### **02/08/2018 - 12/03/2019** (first/last O-NRT product):

S3A\_SL\_2\_WST\_\_\_\_20180802T081059\_20180802T081359\_20180802T103932\_0179\_034\_121\_0900\_MAR\_O\_NR\_002.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20190312T085251\_20190312T085551\_20190312T111941\_0179\_042\_207\_0720\_MAR\_O\_NR\_003.SEN3

S3A PN-SLSTR-L2M-  
**04** - i1r0 - SLSTR  
L2M



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**12/03/2019–15/01/2020** (first/last O-NRT product):

S3A\_SL\_2\_WST\_\_\_\_20190312T085551\_20190312T085851\_20190312T111943\_0180\_042\_207\_0900\_MAR\_O\_NR\_003.SEN3  
S3A\_SL\_2\_WST\_\_\_\_20200115T102242\_20200115T102542\_20200115T130711\_0179\_053\_379\_0720\_MAR\_O\_NR\_003.SEN3

S3 PN-SLSTR-L2M-01-i1r1-SLSTR L2M

**15/01/2020–onwards** (first O-NRT product):

S3A\_SL\_2\_WST\_\_\_\_20200115T102542\_20200115T102842\_20200115T130713\_0179\_053\_379\_0900\_MAR\_O\_NR\_003.SEN3

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Note: Due to an anomaly, filenames of operational products between 12.06.2018 and 03.09.2018 were marked with baseline collection 002, instead of 003.

**SLSTR-B ->**

To form a consistent Collection 003 SST dataset for SLSTR-A users are advised to use operational NTC timeliness data along with the reprocessed data:

**NTC time period and first/last products from each processing baseline**

**Product Notice**

**11/03/2019–13/01/2020** (first/last O-NTC product):

S3B\_SL\_2\_WST\_\_\_\_20190311T025923\_20190311T044022\_20190312T114751\_6059\_023\_046\_\_\_\_MAR\_O\_NT\_003.SEN3  
S3B\_SL\_2\_WST\_\_\_\_20200113T150112\_20200113T164211\_20200115T233307\_6059\_034\_210\_\_\_\_MAR\_O\_NT\_003.SEN3

S3 PN-SLSTR-L2M-01-i1r1-SLSTR L2M

**13/01/2020–onwards** (first O-NTC product):

S3B\_SL\_2\_WST\_\_\_\_20200113T164211\_20200113T182310\_20200116T033450\_6059\_034\_211\_\_\_\_MAR\_O\_NT\_003.SEN3

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If users prefer to use NRT timeliness to complete their SLSTR-A Collection 003 record, they should use the following operational NRT products:

**NRT time period and first/last products from each processing baseline**

**Product Notice**

**12/03/2019–15/01/2020** (first/last O-NRT product):

S3B\_SL\_2\_WST\_\_\_\_20190312T081627\_20190312T081927\_20190312T104653\_0179\_023\_064\_0900\_MAR\_O\_NR\_003.SEN3  
S3B\_SL\_2\_WST\_\_\_\_20200115T094309\_20200115T094609\_20200115T130017\_0179\_034\_236\_0720\_MAR\_O\_NR\_003.SEN3

S3 PN-SLSTR-L2M-01-i1r1-SLSTR L2M

**15/01/2020–onwards** (first O-NRT product):

S3B\_SL\_2\_WST\_\_\_\_20200115T094609\_20200115T094909\_20200115T130019\_0179\_034\_236\_0900\_MAR\_O\_NR\_003.SEN3

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**References**

- Sea Surface Temperature (SLSTR) Algorithm Theoretical Basis Document (ATBD) SLSTR-ATBD-L2SST-v2.5
- Product Data Format Specification – SLSTR Level 1 Products, Ref: S3IPF.PDS.005.1, Issue: 2.9, Date: 20/09/2019
- Product Data Format Specification – SLSTR Level 2 Products, Ref: S3IPF.PDS.005.3, Issue: 2.8, Date: 20/09/2019
- Further information and documentation including all references listed above can be found at: <https://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Sentinel3/SeaSurfaceTemperatureServices/index.html>



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*End of Product Notice*