



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

<b>Mission</b>	Sentinel-3A	
<b>Sensor</b>	SLSTR	
<b>Product</b>	Level 2 Sea Surface Temperature	
<b>Product Notice ID</b>	EUM/OPS-SEN3/DOC/17/	S3A.PN-SLSTR-L2M.002
<b>Issue/Rev Date</b>	05/07/2017	
<b>Version</b>	1.0	
<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 for an update of the Sentinel-3 Sea and Land Surface Temperature Radiometer (SLSTR) Level-2 Sea Surface Temperature products distributed to the Sentinel-3 Validation Team, in Near Real Time (NRT) and Non Time Critical (NTC) timeliness. The Notice describes the SLSTR current processing baseline relevant to Sea Surface Temperature, product quality and limitations, and product availability.</p>



**Processing Information**

<b>Processing baseline</b>	<ul style="list-style-type: none"> <li>• L1 IPF Processing Baseline: 2.17</li> <li>• L2 IPF Processing Baseline: 2.18</li> </ul>
<b>IPF Versions</b>	<ul style="list-style-type: none"> <li>• L1 IPF version: SL1 06.14</li> <li>• L2 IPF version: SL2 06.12</li> <li>• PUG version: 03.29</li> </ul>

**Current Operational Processing Baseline**

<b>IPF</b>	<b>IPF Version</b>	<b>In operation since (creation date)</b>
SL1	06.14	NRT mode: 05/07/2017 13:10 UTC NTC mode: 05/07/2017 13:10 UTC
SL2	06.12	NRT mode: 05/07/2017 13:10 UTC NTC mode: 05/07/2017 13:10 UTC
PUG	03.29	NRT mode: 05/07/2017 13:10 UTC NTC mode: 05/07/2017 13:10 UTC



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## Status of the Processing Baseline

The current processing baseline for Sentinel-3A SLSTR Level-2 Sea Surface Temperature products is v2.18 as deployed in the Marine Centre on 5<sup>th</sup> July 2017. The quality status of the baseline products is as follows:

### Level1 Products:

- **Geometric Calibration**
  - SLSTR nadir and oblique view geolocation accuracy meet the mission requirements (0.5 pixel as per S3 MRTD, 2011).
- **TIR Radiometric Calibration**
  - SLSTR TIR radiometric accuracy meets the mission requirements (S3 MRTD, 2011).
- **Basic cloud screening**
  - **Summary\_cloud**

The summary cloud bit is only set if any one of the following cloud tests detects cloud:

    - Gross Cloud test
    - Thin cirrus test
    - Medium high test
    - Fog/low stratus test
    - 11um Spatial coherence test
    - 11/12 view difference test
    - 3.7/11 view difference test
    - Visible cloud test
    - Threshold 1.375 cirrus test
    - 1.6 large scale histogram test
    - 2.25 large scale histogram test

The results of the remaining 3 cloud tests (1.6 and 2.25 small histogram tests and IR histogram test) are not taken into account in the L2 cloud word. The results of these tests are however still available in the individual cloud test bits in L1 cloud flags.

### 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 N3, D2 and D3 retrievals; N2 uncertainties are currently slightly higher at  $\pm 0.4$  K. However, residual cloud contamination from the basic cloud mask increases the overall product uncertainty, which will be addressed with an advanced Bayesian-based cloud mask in a future update.
  - It is recommended to only use the dual-view part of the SLSTR swath for reference SST applications.
  - The current algorithm implementation interpolates SST coefficients to the tie point grid before the image grid.



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### Known Product Quality Limitations

Sentinel-3A SLSTR Level-1b Processing Baseline 2.17 has the following known limitations relevant to Sea Surface Temperature:

- Geometric Calibration Model
  - SLSTR oblique view geolocation and co-registration to the nadir view has been improved, currently estimated (using robust statistics) at  $0.2 \pm 0.2$  (rms: 0.3) pixel across-track and approximately  $0.1 \pm 0.2$  (rms: 0.2) in the along-track. The nadir view geolocation is currently estimated at approximately  $0 \pm 0.1$  (rms: 0.1) pixel along-track and  $-0.4 \pm 0.1$  (rms: 0.4) pixel across-track. Further improvement both in nadir and oblique view is expected in the next release.
- 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 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.
- Basic Cloud Screening
  - Although significant improvements have been made towards resolving many of the issues with the cloud screening modules, the basic cloud screening does not yet perform optimally and areas of under-flagging and over-flagging remain. Here is the list of open issues:
    - Overall cloud screening (summary\_cloud) is still not nominal
    - Under-flagging of fog-low stratus over ocean
    - Over-flagging of 1.6 large-scale histogram test near the coastline
    - The 2.25 large-scale histogram test can sometimes results in a box-like patterns
    - Not nominal cloud masking criteria in sun glint region (can cause inconsistency between sun glint and not sun glint region)
- Differences between NRT and NTC products
  - Two issues have been identified:
    - Differences in brightness temperature measurement data between NRT and NTC products
    - Different numbers of rows between NRT and NTC products
  - It is recommended to use NRT timeliness until the issue is resolved



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Sentinel-3A SLSTR Level-2 SST with Processing Baseline 2.18 has the following known limitations:

- SST retrieval
  - The SST retrieval coefficients for nadir-only cases (N2 and N3) require further optimization.
  - 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 not use a measurement if the satellite zenith angle is greater than 55 degrees.
- WST theoretical uncertainties
  - The SST theoretical uncertainties are preliminary and require optimization. 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 using the data. The SSES bias and standard deviation values will be refined in future updates.
- WST quality levels
  - The quality levels have been updated in this product release. For the best quality sea surface temperature observations, it is recommended to use Quality Level 5 at night-time and both Quality Level 4 and 5 during daytime. The quality levels are assigned on the values of the calculated pixel theoretical uncertainty and will be refined in future updates. Users should note that most day time pixels are Quality Level 4 and night time are Quality Level 5.
- WST I2p\_flags
  - The cloud flag (mask 10) is set for all surface types and not just for water pixels.



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- 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.
  
- WST cloud mask
  - SSTs are provided for all pixels in the WST product even for pixels that were classed as cloudy.
  - An additional filter to check for where WST dt\_analysis is  $\pm 5K$  has been introduced to remove gross cloud contamination. This is a temporary feature whilst further cloud screening improvements are implemented in further product releases. The filter could cause some overflagging, particularly near fronts.
  
- 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. 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://coda.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 pilot service Copernicus Online Data Access and is available to all users



**Any Other Useful Information**

- None

**References**

- 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>

**Static ADFs**

S3A_SL_2_PCP_AX_20160216T000000_20991231T235959_20170627T120000	MPC_O_AL_004.SEN3
S3A_SL_2_D2_CAX_20160216T000000_20991231T235959_20170330T120000	MPC_O_AL_004.SEN3
S3A_SL_2_D3_CAX_20160216T000000_20991231T235959_20170330T120000	MPC_O_AL_004.SEN3
S3A_SL_2_N2_CAX_20160216T000000_20991231T235959_20170330T120000	MPC_O_AL_004.SEN3
S3A_SL_2_N3_CAX_20160216T000000_20991231T235959_20170330T120000	MPC_O_AL_004.SEN3
S3A_SL_2_N3RCAX_20160216T000000_20991231T235959_20170330T120000	MPC_O_AL_004.SEN3
S3A_SL_2_F1N_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S7N_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S7O_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S8N_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S8O_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S9N_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_S9O_AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_SDI2AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_SDI3AX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3A_SL_2_SSESAX_20160216T000000_20991231T235959_20170517T120000	MPC_O_AL_003.SEN3
S3_SL_2_SST_AX_20160216T000000_20991231T235959_20170515T120000	MPC_O_AL_002.SEN3
S3A_SL_2_LSTCAX_20160216T000000_20991231T235959_20161125T120000	MPC_O_AL_002.SEN3
S3A_SL_2_LSTEAX_20160216T000000_20991231T235959_20170116T120000	MPC_O_AL_002.SEN3
S3_SL_2_LSTBAX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3_SL_2_LSTVAX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3
S3_SL_2_LSTWAX_20000101T000000_20991231T235959_20151214T120000	MPC_O_AL_001.SEN3

**End of the Product Notice**