



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

Mission	Sentinel-3A & Sentinel-3B	
Sensor	SLSTR-A & SLSTR-B	
Product	Level 2 Sea Surface Temperature	
Product Notice ID	EUM/OPS-SEN3/DOC/19/1063159	S3.PN-SLSTR-L2M.001
Issue/Rev Date	12/03/2019	
Version	1.0	
Preparation	This Product Notice was prepared by EUMETSAT with assistance from the S3 Mission Performance Centre.	
Approval	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) 2.46 (-A) and 1.18 (-B) deployed on 12/03/2019. It is applicable to both Near Real Time (NRT) and Non Time Critical (NTC) timeliness.</p> <p>The Notice describes the Level-1B current status, the processing baseline, the product quality and known limitations for both SLSTR-A and SLSTR-B.</p> <p>The main change is related to the public release of SLSTR-B Level-2 SST. In addition, a small adjustment has been made to the quality levels increasing the amount of daytime QL=5 data for both sensors.</p>



Processing Baseline

	S3A	S3B
Processing Baseline	<ul style="list-style-type: none"> Processing Baseline: 2.46 	<ul style="list-style-type: none"> Processing Baseline: 1.18
IPFs version	<ul style="list-style-type: none"> SL_2 IPF version: 06.16 PUG version: 3.35 	

Current Operational Processing Baselines

IPF	IPF Version	Into operations since
S3A SL2	06.16	NRT mode: 12/03/2019 10:15 UTC NTC mode: 12/03/2019 10:15 UTC
S3B SL2	06.16	NRT mode: 12/03/2019 10:15 UTC NTC mode: 12/03/2019 10:15 UTC
PUG	3.35	NRT mode: 12/06/2018 10:15 UTC NTC mode: 12/06/2018 10:15 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 2.46 and PB 1.18, respectively. The baseline was deployed in the marine processing centre on 12/03/2019 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.
 - There is observed seasonality signal and yearly trend in the along track SLSTR-A oblique view with the maximum offset (during December/January) up to -0.8 pix. It is expected to be resolved in the next processing baseline.
 - Current offset (still within requirements) in oblique view along track is: SLSTR-A ~ -0.5 pix and SLSTR-B ~ -0.3 pix.

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 ± 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

SLSTR-A Level-1b Processing Baseline 2.37 and SLSTR-B Level-1b Processing Baseline 1.12 have the following known limitations relevant to Sea Surface Temperature:

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).



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- 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.

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.

SLSTR-A Level 2 SST Processing Baseline 2.46 and SLSTR-B Level 2 SST Processing Baseline 1.18 have the following known limitations:

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.



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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. 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.

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://codas.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



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

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>
- Product Data Format Specification – SLSTR Level 1 & 2 Instrument Products, Ref: S3IPF.PDS.005.1, Issue: 2.7, Date: 06/02/2018
<https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-slstr/document-library>
<https://www.eumetsat.int/website/home/Data/TechnicalDocuments/index.html>
- Sea Surface Temperature (SLSTR) Algorithm Theoretical Basis Document (ATBD) SLSTR-ATBD-L2SST-v2.5
<https://www.eumetsat.int/website/home/Data/TechnicalDocuments/index.html>
- Further information and documentation can be found at:
<https://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Sentinel3/SeaSurfaceTemperatureServices/index.html>

End of Product Notice