



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

Mission	Sentinel-3A	
Sensor	SLSTR	
Product	Level 2 Sea Surface Temperature	
Product Notice ID	EUM/OPS-SEN3/DOC/18/984462	S3A.PN-SLSTR-L2M.003
Issue/Rev Date	2/05/2018	
Version	1.1	
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 for an update of the Sentinel-3 Sea and Land Surface Temperature Radiometer (SLSTR) Level-2 Sea Surface Temperature products applicable to all timeliness: Near Real Time (NRT) and Non Time Critical (NTC). The Notice describes the SLSTR current processing baseline relevant to Sea Surface Temperature, product quality and limitations, and product availability.</p> <p>Baseline collection (parameter within the filename) has been incremented from 002 to 003 due to the implementation of the new Bayesian cloud detection.</p> <p>Update notice: This notice has been updated to further explain a limitation of the Bayesian cloud screening.</p>



Processing Information

Processing baseline	<ul style="list-style-type: none"> • L1 IPF Processing Baseline: 2.29 • L2 IPF Processing Baseline: 2.33
IPF Versions	<ul style="list-style-type: none"> • L1 IPF version: SL1 06.15 • L2 IPF version: SL2 06.14 • PUG version: 03.34

Current Operational Processing Baseline

IPF	IPF Version	In operation since (creation date)
SL1	06.15	NRT mode: 04/04/2018 10:09 UTC NTC mode: 04/04/2018 10:09 UTC
SL2	06.14	NRT mode: 04/04/2018 10:09 UTC NTC mode: 04/04/2018 10:09 UTC
PUG	03.34	NRT mode: 07/03/2018 10:39 UTC NTC mode: 07/03/2018 10:39 UTC



European Union
Programme



Status of the Processing Baseline

The current processing baseline for Sentinel-3A SLSTR Level-2 Sea Surface Temperature products is v2.33 as deployed in the Marine Centre on 4th April 2018. 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).
- **Cloud screening**
 - A new cloud mask using Bayes theorem to identify clear sky scenes has been introduced for this product release.

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.
 - It is recommended to only use the dual-view part of the SLSTR swath for reference SST applications.
 - It is suggested to only use Quality Level 5 data.
 - The current SSES for quality levels lower than 5 are not well prescribed and will be updated after the next reprocessing.
 - 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.
 - The current algorithm implementation interpolates SST coefficients to the tie point grid before the image grid.
- **New Bayesian cloud screening**
 - A new Bayesian cloud detection has been implemented over sea. Cloud detection is based on calculating a probability of clear-sky of each pixel based on the satellite observation, prior information about the atmosphere and surface conditions and the respective uncertainties in these variables. Current implementation is using European Centre for Medium-range Weather Forecasting (ECMWF) NWP data as input to simulate clear sky brightness temperatures and top of the atmosphere reflectances. The radiative transfer model used for simulating brightness temperatures is RTTOV. The probabilities have been included as experimental fields in the L2P WST product, are used to derive the Quality Levels, and are used for the cloud flag instead of the previously used basic cloud screening.
- **SST attributes (WST)**
 - The SST scale_factor and add_offset values have been modified to be in line with those used by the Group for High Resolution Sea Surface Temperature (GHRSSST).



European Union
Programme



- There has been a modification to the “long_name” attribute value of the WST sea_surface_temperature variable.

Known Product Quality Limitations

Sentinel-3A SLSTR Level-1b Processing Baseline 2.29 has the following known limitations relevant to Sea Surface Temperature:

- Geometric Calibration Model
 - SLSTR nadir view geolocation and co-registration to the oblique view has been improved. Current estimates (using robust statistics) for nadir view are -0.12 ± 0.03 (rms: 0.13) pixel across-track and -0.03 ± 0.04 (rms: 0.05) in the along-track. The oblique view geolocation is currently estimated at approximately -0.15 ± 0.09 (rms: 0.17) pixel across-track and -0.45 ± 0.12 (rms: 0.47) pixel along-track. Further improvement in oblique view is expected.
- 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.
- Bayesian Cloud Screening
 - A new cloud mask using Bayes theorem to identify clear sky scenes has been introduced for this product release. 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.
 - For the Bayesian cloud mask, over-flagging is more pronounced in the coastal region for NRT products. Until the issue is resolved recommendation is to use NTC products if sea surface temperature variable is used from the coastal region.



European Union
Programme



- Differences between NRT and NTC products
 - There are small expected differences between NRT and NTC products due to the regridding algorithm.
 - Due to a PUG anomaly several scanlines per day are missing only in NTC products. This will be resolved in the next update of PUG component.

Sentinel-3A SLSTR Level-2 SSTs with Processing Baseline 2.33 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.
- 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 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
 - The quality levels have been updated in this product release. 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.



European Union Programme



- 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://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>



European Union
Programme



Static ADFs

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_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
S3__SL_2_SST_AX_20160216T000000_20991231T235959_20180219T120000	MPC_O_AL_003.SEN3
S3A_SL_2_D2_CAX_20160216T000000_20991231T235959_20180129T120000	MPC_O_AL_005.SEN3
S3A_SL_2_D3_CAX_20160216T000000_20991231T235959_20180129T120000	MPC_O_AL_005.SEN3
S3A_SL_2_N2_CAX_20160216T000000_20991231T235959_20180129T120000	MPC_O_AL_005.SEN3
S3A_SL_2_N3_CAX_20160216T000000_20991231T235959_20180129T120000	MPC_O_AL_005.SEN3
S3A_SL_2_N3RCAX_20160216T000000_20991231T235959_20180129T120000	MPC_O_AL_005.SEN3
S3A_SL_2_PCP_AX_20160216T000000_20991231T235959_20180219T120000	MPC_O_AL_005.SEN3
S3A_SL_2_SDI2AX_20160216T000000_20991231T235959_20180201T120000	MPC_O_AL_002.SEN3
S3A_SL_2_SDI3AX_20160216T000000_20991231T235959_20180201T120000	MPC_O_AL_002.SEN3
S3A_SL_2_SSESAX_20160216T000000_20991231T235959_20180226T120000	MPC_O_AL_005.SEN3

End of the Product Notice