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/18/1012355	S3A.PN-SLSTR-L2M.004
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Version	1.0	
Preparation	This Product Notice was prepared by EUMETSAT with assistance from the S3 Mission Performance Centre	
Approval	EUMETSAT Mission Management	

Summary

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.

The main changes in this processing baseline are derived from updates to Level-1 processing that corrects for misalignment in the input ECMWF MET latitude grid and prior temperature field used for Bayesian cloud masking in NRT product. These two changes improve the quality of the Bayesian cloud masking in coastal and inland waters.

Processing Information

Processing baseline	• L1 IPF Processing Baseline: 2.37 • L2 IPF Processing Baseline: 2.37
IPF Versions	• L1 IPF version: SL1 06.16 • L2 IPF version: SL2 06.15 • PUG version: 03.35

Current Operational Processing Baseline

IPF	IPF Version	In operation since (creation date)
SL1	06.16	NRT mode: 02/08/2018 10:01 UTC NTC mode: 02/08/2018 10:01 UTC
SL2	06.15	NRT mode: 02/08/2018 10:01 UTC NTC mode: 02/08/2018 10:01 UTC
PUG	03.35	NRT mode: 12/06/2018 09:43 UTC NTC mode: 12/06/2018 09:43 UTC

Status of the Processing Baseline

The current processing baseline for Sentinel-3A SLSTR Level-2 Sea Surface Temperature products is v2.37 as deployed in the Marine Centre on 2nd August 2018. The quality status of the baseline products is as follows:

Level-1B Products:

- Geometric Calibration
  - SLSTR nadir and oblique view geolocation accuracy meet the mission requirements (0.5 pixel as per S3 MRTD, 2011).
  - SLSTR geometric calibration model did not change in this processing baseline. However, due to the seasonal variability nadir view geolocation and co-registration to the oblique view has been improved. Current estimates (using robust statistics) for nadir are the same both in along and cross track and close to zero:-0.02±0.03 (rms: 0.04) pixel. The oblique view geolocation is currently estimated zero (-0.00±0.09, rms: 0.09) pixel across-track and -0.25±0.09 (rms: 0.26) pixel along-track.
- TIR Radiometric Calibration
  - SLSTR TIR radiometric accuracy meets the mission requirements (S3 MRTD, 2011).
- ECMWF Meteorological Fields
  - Updates to ECMWF data processing to correct a misalignment in the input latitude grid.
- Cloud masking
  - The prior temperature field for the Bayesian and Probabilistic cloud masking has been updated to use ECMWF skin temperature for NRT products only.

Level-2 Products:

- Bayesian Cloud Masking
  - Updates to ECMWF data processing provide improvements to the quality of the Bayesian cloud mask in coastal and inland water areas.

Known Product Quality Limitations

Sentinel-3A SLSTR **Level-1B** with the Processing Baseline 2.37 has 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 SST, the impact is still being assessed but is estimated to be very small (<< 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.

Sentinel-3A SLSTR **Level-2 SSTs** with Processing Baseline 2.37 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
  - 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. Quality Level 4 D2 or D3 data should not currently be used for any 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://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 Copernicus Online Data Access service 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

- 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

Updated Static ADFs

- None

End of the Product Notice