Copernicus Sentinel-3 Product Notice – STM L2 Marine

Mission	S3A & S3B
Sensor	SRAL/MWR
Product	L2 NRT, STC and NTC (Marine Products)
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Preparation	This Product Notice was prepared by EUMETSAT with the support of the ESA and S3 Mission Performance Centre experts
Approval	EUMETSAT Mission Management

Summary

This document is the Product Notice for the public release of Sentinel-3A & 3B Surface Topography Mission (STM) Level-2 Near Real Time (NRT), Short Time Critical (STC) and Non-Time Critical (NTC) products generated at the Marine Centre, EUMETSAT.

This Product Notice describes the STM status, processing baseline, product quality and limitations, and product availability status.

Processing Information	
Processing Baseline	• Processing Baseline (PB) (S3A/S3B): **2.68-MARINE** ○ SRAL L1 IPF (SR-1): version **06.18** ○ MWR L1 IPF (MW-1): version **06.11** ○ SRAL/MWR L2 IPF (SM-2): version **06.50** ○ The list of Static Auxiliary Data Files (ADFs) that are part of the Processing Baseline are at the end of this document. ○ Some static Auxiliary Data Files (ADFs) are instrument specific, and hence there are specific files for S3A and S3B. The processor version for S3A and S3B however, remains the same.

Description

L2 Marine Products Quality

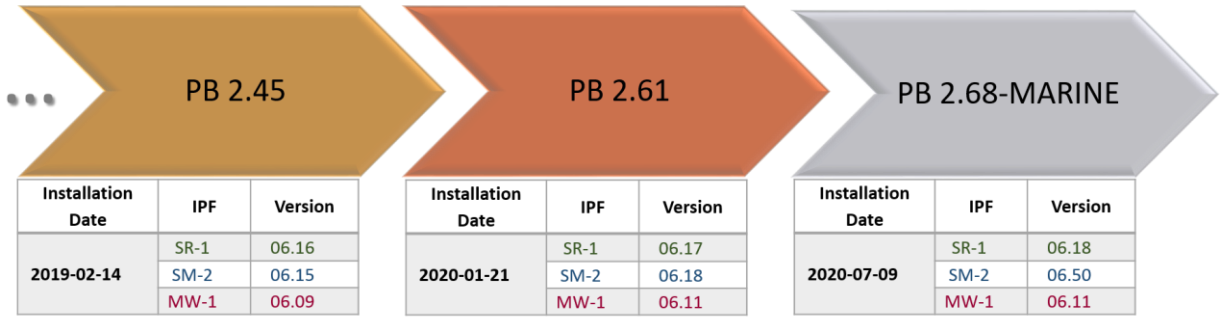
The quality of L2 WAT product for the 3 SRAL parameters (range, SWH, and wind speed) is within the mission requirements.
The data are produced within requirements also in terms of completeness and timeliness. In case of any data production/dissemination anomaly, the users can get the most up to date info via the User Notification Service (UNS), https://uns.eumetsat.int, subscription available at https://eoportal.eumetsat.int.
Some known limitations on the mission dataset are described in the following sections.

Status of the Processing Baselines

The collection of IPF version and static ADFs is known as the Processing Baseline (PB). For S3A and S3B the PB number is 2.68-MARINE. These numbers are internal to the PDGS, only the IPF version and ADFs names/versions are available to the end-users in the products. A collection of several PBs that do not change the mission dataset in a significant way is known as a Baseline Collection (BC). PB 2.68-MARINE belongs to BC 004, the PBs from 2.24 up to 2.45 belong to BC 003. This Baseline Collection number is clearly indicated in the SAFE directory name as the last three digits before the extension `.SEN3`

The installation date of PB 2.68-MARINEis **2020-07-09** for both S3A and S3B. All data generated from that date onwards is produced with this new PB. Installation dates of the previous two PBs are detailed in the following figure.

Details on how and where to obtain the data is presented in the section “Product Availability”.



Installation Date	IPF	Version
2019-02-14	SR-1	06.16
	SM-2	06.15
	MW-1	06.09

Installation Date	IPF	Version
2020-01-21	SR-1	06.17
	SM-2	06.18
	MW-1	06.11

Installation Date	IPF	Version
2020-07-09	SR-1	06.18
	SM-2	06.50
	MW-1	06.11

Changes between PB 2.61 and PB 2.68-MARINE

Only minor changes are introduced by the new Processing Baseline, PB 2.68-MARINE:

- Update of the Marine Land Mask (SR_2_MLM_AX version 004) for the generation of the Marine products. There is no change to the coverage of the Marine products over ocean ; the only change is the extension of the coverage from the coastline to land; from 10 km to 25 km.
- Improvement of the Sea-Ice concentration close to the coastline;
- Fix of an anomaly related to the computation of the filtered ionospheric correction on very small granules ;
- Improvement of the L1 AUTOCAL, the expected impact at Level-2 is low (below 0.1 dB on backscatter coefficient) but should slightly improve the wind-speed.

A high level analysis of how these changes affect the dataset can be seen in the following link:
https://www.eumetsat.int/website/home/News/DAT_5094395.html

Changes in previous PBs are presented in the Annex, at the end of the document.

Recent evolutions of the Sentinel-3 ground segment

Some evolutions of the Sentinel-3 ground segment are not specifically linked to new versions of the processors and come from other components or data sources. The following evolutions are relevant to end users:

- New OLTC on-board S3B
  On 2020-06-18 an updated OLTC was uploaded on board S3B, supporting the Open-Loop tracking mode. This is more relevant for land users, as over ocean no impact is expected.
- New data formats for S3 Altimetry data
  Since May 2019, the S3 SRAL L2 NRT products are also available in BUFR format and are disseminated via EUMETCast, more information here: https://www.eumetsat.int/website/home/News/DAT_4368231.html

Known product quality limitations

The Sentinel-3 STM L2 products have some known processing limitations, which are reported in the next pages as «Anomalies» or «Notices». Anomalies are related to issues on the processing baseline (e.g. *bugs*) whilst Notices are related to limitations which were corrected in this PB or are planned to be improved in the medium to long term (e.g. *algorithm evolution, calibration campaigns, etc.*).

Notices on the products

- **Notice #1 – MWR calibration is not completed**

MWR calibration is not completed, so the radiometer measurement values and derived quantities do not have an optimised performance yet.

The MWR L1 brightness temperatures exhibit a difference of up to 1 K between ascending and descending tracks for the 23.8 GHz channel. Work to understand the source of this difference has been performed and it is expected the on future versions of the MWR processing this can be tackled.

In the L2 products the radiometer wet tropospheric correction deduced from 5 parameters (*rad_wet_tropo_cor_sst_gam_01_ku* and *rad_wet_tropo_cor_sst_gam_01_plrm_ku*) has not been adjusted yet and should not be used.

The composite wet tropospheric correction (*comp_wet_tropo_cor_01_ku* and *comp_wet_tropo_cor_01_plrm_ku*) has not been adjusted yet and should not be used.

- **Notice #2 - MWR parameters not computed due to MWR calibration over open ocean**

During MWR calibrations over open ocean, the brightness temperatures for both channels are not computed and set to default values in the product.

As a consequence, 1-Hz parameters derived from the MWR are set to default values, except for the atmospheric attenuation. This affects the wet tropospheric correction, water vapour content, and cloud liquid water content.
Corrected since 01/03/2018 (sensing time), previous data processed may exhibit the issue.

- **Notice #3 - Mean values of Ku band and C band sigma0**

The Ku-band sigma0 in all modes (LRM, PLRM and SAR) has been biased to be aligned with the mean value for Envisat (10.8 dB without the atmospheric attenuation). The sigma0 present in the products is corrected for attenuation, since PB 2.24.

A system bias is applied to the Ocean processing, please check the values below; highlighted in blue are the values currently applied.

Table 1 - Applied Level S3A 2 sigma0 bias, w.r.t. to L1 processing.

Processing Baseline	***S3A SAR (Ku Band)***	***S3A LRM/PLRM (Ku band)***	***S3A LRM (C band)***
PB <= 2.9	-25.65 dB	- 2 dB	0 dB
PB <= 2.45	-18.96 dB	- 2 dB	0 dB
PB >= 2.61	-0.65 dB	- 1.80 dB	0.09 dB

Table 2 - Applied Level S3B 2 sigma0 bias, w.r.t. to L1 processing.

Processing Baseline	***S3B SAR (Ku Band)***	***S3B LRM/PLRM (Ku band)***	***S3B LRM (C band)***
PB < 2.33	-18.96 dB	- 2 dB	0 dB
PB <= 2.33/1.13	-19.17 dB	- 2.21 dB	-0.39 dB
PB >= 2.61	-0.68 dB	- 1.87 dB	0.09 dB

Note that the sigma0 derived from ice sheet and ocog retrackers exhibits a mean value about 30 dB for open ocean.

- **Notice #4 - Noise on the dual-frequency ionospheric correction**

The higher noise of the C band range inherent to the PLRM processing contributes to a high noise in the dual frequency ionospheric correction. Currently this noise is present only in the *unfiltered* ionospheric correction (*iono_cor_alt_01_ku*), as of PB 2.61 the SSHA is now calculated with the *filtered* ionospheric correction (*iono_cor_alt_filtered_01_ku*), derived from the SRAL altimeter dual frequency, thus this issue is fixed if using the SSHA calculated in the product.
Corrected with this PB 2.61; previous data processed exhibit this issue.

- **Notice #5 – Sea State Bias (SSB) is still not optimized for Sentinel-3**

The SSB correction has not been tuned for Sentinel-3A/B and contains the Jason-2 SSB solution.

- **Notice #6 – Some geophysical flags have not been tuned for Sentinel-3**

Some geophysical flags were derived from the Envisat mission and have not been tuned for Sentinel-3A: rain flag and ocean/sea ice flag.

- **Notice #10 – CNES/CLS 15 MSS is set to default values in certain zones** ("EUM/Sen3/NCR/3484")

The MSS CNES-CLS15 is set to the default value over inland waters, the Beaufort Sea, certain Antarctica regions, and over land. This means it cannot be used to provide a global SSHA. Users using this MSS instead of the default DTU18 MSS used to generate SSHA on the product should be aware of this.

- **Notice #11 – Shortcoming in SWH measurement at low wave height** ("EUM/Sen3/NCR/4108")

At low wave heights, below 1.5 meter, a significant number (around 4 % of the cases) of SAR 20-Hz SWH measurements (*swh_ocean_20_ku*) are set to a value of 0. This is observed even for the case of open ocean without sea ice. This is related to the fitting mechanism used, and a solution is being investigated. During the averaging to 1-Hz measurements, previous PBs would consider the 20-Hz values set to 0 as valid and included those in the 1 Hz averaging, thus lowering the value of the averaged 1 Hz measurements at low wave height. Note that since PB 2.61 the retracked SWH can have values between -0.5m and 20m, before the lower boundary was 0 meters.
Corrected with this PB 2.61; previous data processed exhibit this issue.

- **Notice #14 – Bad handling of _FillValue for the field swh_ocean_20_plrm_ku** ("EUM/Sen3/NCR/3971")

The field *swh_ocean_20_plrm_ku* is is affected by numerical overflow (i.e. padded to _FillValue) when it takes values above 32.767 m.

- **Notice #15 - KREMS safe zone (Pacific Ocean)** ("EUM/Sen3/AR/5239")

The KREMS safe zone corresponds to a zone of the globe where the radiometer (MWR) is disabled and thus there is no wet tropospheric correction available from the radiometer, causing the SSHA to be set to a default value. Users interested in having SSHA in this area are advised to recalculate SSHA with the ECMWF wet tropo correction (*mod_wet_tropo_cor_zero_altitude_01*) instead of the radiometer one (*rad_wet_tropo_cor_01_ku*).
The area of the safe zone around the KREMS radar facility has changed since the beginning of the Mission (S3A/S3B) as follows:

- From the beginning of S3A Mission until 2019-01-17 it was defined as a circular area of about 25 km, radius;
- From 2019-01-17 until 2019-05-28, the zone has been enlarged to 300 km to avoid any damage to the MWR instrument;
- From 2019-05-28 onwards, the zone has a radius of 100 km around the KREMS radar facility.

- **Notice #16 - Applied Ku band and C band range bias** ("EUM/Sen3/AR/6044")

At Level 2, the Ku-band (LRM/PLRM and SAR) and C-Band range is biased in order to correct for errors identified in the S3A/S3B SRAL internal path delay characterization errors.

The values are presented below; highlighted in blue are the values currently applied.

Table 3 – Applied Level 2 range bias, w.r.t. to L1 processing.

Processing Baseline	***S3A SAR/LRM/PLRM (Ku Band)***	***S3A LRM (C band)***	***S3B SAR/LRM/PLRM (Ku Band)***	***S3B LRM (C band)***
PB < 2.61	0 mm	0 mm	0 mm	0 mm
PB >= 2.61	2 mm	2.5 mm	-9 mm	+8.5 mm

In the near future, these static L2 biases will be reduced/removed due to corrections on the on-ground L1b processing.

- **Notice #17 – Jitter Noise on top of the sea level at sea-ice leads** ("SIIIMPC-3816")
  Since the zero-padding is not applied when building the waveform after range FFT, the sea level features a significant level of jitter noise at sea-ice leads

- **Notice #18 Anomaly - S3 SRAL Range PTR (Point Target Response) is less stable than expected** (EUM/Sen3/AR/5963)

The S3A SRAL Range PTR (Point Target Response) has a shape evolving in time, with the main lobe width decreasing in time, while the first left sidelobe is shifting in time. The first right side sidelobe is stable.
These changes are just partially corrected for with the current calibration scheme and this may affect the long-term stability for range and wave-height.
Improvements to the ground processing are under study to correct this issue.

Anomalies

Open Anomalies

The anomalies listed below are affecting data products processed with PB 2.68-MARINE. These anomalies will be resolved as soon as possible.

- **Anomaly "EUM/Sen3/AR/5722" SAMOSA MQE computation wrongly squared**

The field *mqe_ocean_20_ku* is supposed to be the mean quadratic error (mqe) of the fitting whereas instead was found to be the square of the mean quadratic error.
Affects: L2 SRAL NRT/STC/NTC

Limited product degradation

The following anomalies are product degradations clearly delimited in time, when possible, it is intended that these will be solved in the next reprocessing.

- **Anomaly "EUM/Sen3/NCR/3403" – Issue in range positioning the SAR waveform at Greenwich Meridian**

  A few 20-Hz geophysical measurements (range, wave height and sigma nought) are systematically padded to _FillValue at Greenwich meridian cross in SAR and PLRM mode. This issue is related to an issue in the OLTC on board of S3A. This affects some 20-Hz measurements crossing the meridian, but it is not enough to invalidate the 1-Hz data. It affects about 21 seconds of data per cycle.
  Affects: L2 SRAL NRT/STC/NTC before 18/12/2017 (**corrected** for data after this date)

Closed Anomalies

The following anomalies are closed and not affecting data products processed with PB 2.68-MARINE.

- **Anomaly "EUM/Sen3/NCR/4085" - Incorrect Values of Sea Ice Concentration at transition between land-sea ice**

At transition between land-sea ice, the values of sea ice concentration field (*sea_ice_concentration_20_ku*) drop to values around zero (i.e. water without sea ice) whereas it is expected instead to signal the presence of floating sea ice (values around 80-100 %).
Affects: L2 SRAL NRT/STC/NTC
Corrected with PB 2.68-MARINE; data processed with previous PBs exhibit this issue

- **Anomaly "EUM/Sen3/AR/6078" Small NRT granules may have defaulted SSHA**

In case of small NRT granules, the SSHA variable may be defaulted due to missing filtered ionospheric correction. For the time being users will need to recalculate SSHA using unfiltered ionospheric correction or modelled GIM correction.
Affects: L2 SRAL NRT processed with PB 2.61
Corrected with PB 2.68-MARINE; data processed with previous PBs exhibit this issue

Current Processing Baseline – Static ADFs

The following list is the complete list of static ADF used by the processors. Any change from the previous processing baseline is highlighted in red. A brief description of the role of each ADF in processing is available in the product manifest.

MWR L1

- ***S3A***

S3A_MW_1_SLC_AX_20160216T000000_20991231T235959_20190621T120000___MPC_O_AL_003.SEN3
S3A_MW___STD_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3A_MW___CHDNAX_20160216T000000_20991231T235959_20170908T120000___MPC_O_AL_004.SEN3
S3A_MW___CHDRAX_20160216T000000_20991231T235959_20170908T120000___MPC_O_AL_004.SEN3

- ***S3B***

S3B_MW_1_SLC_AX_20180425T000000_20991231T235959_20190621T120000___MPC_O_AL_002.SEN3
S3B_MW___STD_AX_20180425T000000_20991231T235959_20180409T120000___MPC_O_AL_001.SEN3
S3B_MW___CHDNAX_20180425T000000_20991231T235959_20181116T120000___MPC_O_AL_002.SEN3
S3B_MW___CHDRAX_20180425T000000_20991231T235959_20181116T120000___MPC_O_AL_002.SEN3

SRAL L1

- **Common**

S3__AX___CST_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR___LSM_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3

- **S3A**

S3A_SR___CHDNAX_20160216T000000_20991231T235959_20200312T120000___MPC_O_AL_006.SEN3
S3A_SR___CHDRAX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_005.SEN3
S3A_SR_1_CONCAX_20160216T000000_20991231T235959_20171130T120000___MPC_O_AL_003.SEN3
S3A_SR_1_CONMAX_20160216T000000_20991231T235959_20180213T120000___MPC_O_AL_007.SEN3

- **S3B**

S3B_SR___CHDNAX_20180425T000000_20991231T235959_20190402T120000___MPC_O_AL_004.SEN3
S3B_SR___CHDRAX_20180425T000000_20991231T235959_20190402T120000___MPC_O_AL_004.SEN3
S3B_SR_1_CONCAX_20180425T000000_20991231T235959_20180409T120000___MPC_O_AL_001.SEN3
S3B_SR_1_CONMAX_20180425T000000_20991231T235959_20180409T120000___MPC_O_AL_001.SEN3

SRAL/MWR L2

- **Common**

S3__SR_2_CP00AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_CP06AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_CP12AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_CP18AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_EOT2AX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_003.SEN3
S3__SR_2_FLT_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_GEO_AX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_002.SEN3
S3__SR_2_LNEQAX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_003.SEN3
S3__SR_2_LRC_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_LT2_AX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_003.SEN3
S3__SR_2_LUTEAX_20160216T000000_20991231T235959_20170713T120000___MPC_O_AL_002.SEN3
S3__SR_2_LUTFAX_20160216T000000_20991231T235959_20170713T120000___MPC_O_AL_002.SEN3
S3__SR_2_LUTSAX_20160216T000000_20991231T235959_20181127T120000___MPC_O_AL_003.SEN3
S3__SR_2_MAG_AX_20160216T000000_20991231T235959_20170811T140000___MPC_O_AL_002.SEN3
S3__SR_2_MDT_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_MLM_AX_20160216T000000_20991231T235959_20200512T120000___MPC_O_AL_004.SEN3
S3__SR_2_MSMGAX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_MSS1AX_20160216T000000_20991231T235959_20170713T120000___MPC_O_AL_002.SEN3
S3__SR_2_MSS2AX_20160216T000000_20991231T235959_20190402T120000___MPC_O_AL_003.SEN3
S3__SR_2_ODLEAX_20160216T000000_20991231T235959_20170322T120000___MPC_O_AL_002.SEN3
S3__SR_2_RET_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_RRC_AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_S1AMAX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_S1PHAX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_S2AMAX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_S2PHAX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD01AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD02AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD03AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD04AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD05AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD06AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD07AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD08AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD09AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3
S3__SR_2_SD10AX_20000101T000000_20991231T235959_20151214T120000___MPC_O_AL_001.SEN3

S3__SR_2_SD11AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SD12AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SET_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SFL_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SHD_AX_20160216T000000_20991231T235959_20181127T120000_____MPC_O_AL_002.SEN3
S3__SR_2_SI01AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI02AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI03AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI04AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI05AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI06AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI07AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI08AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI09AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI10AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI11AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SI12AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SIGLAX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SIGSAX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SSM_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SST_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_SURFAX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3__SR_2_WNDLAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_002.SEN3
S3__SR_2_WNDSAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_002.SEN3
S3__SR_2_EOT1AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR_2_LT1_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__AX___CST_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3__SR___LSM_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3

- **S3A**

S3A_SR_2_CCT_AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR_2_IC01AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC02AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR_2_IC03AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC04AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR_2_IC05AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC06AX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR_2_IC07AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC08AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC09AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_IC10AX_20160216T000000_20991231T235959_20161010T120000_____MPC_O_AL_002.SEN3
S3A_SR_2_SSBLAX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR_2_SSBSAX_20000101T000000_20991231T235959_20151214T120000_____MPC_O_AL_001.SEN3
S3A_SR___CHDNAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_005.SEN3
S3A_SR___CHDRAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_005.SEN3
S3A_SR_2_CON_AX_20160216T000000_20991231T235959_20200312T120000_____MPC_O_AL_016.SEN3
S3A_MW___CHDRAX_20160216T000000_20991231T235959_20170908T120000_____MPC_O_AL_004.SEN3
S3A_SR___CHDNAX_20160216T000000_20991231T235959_20200312T120000_____MPC_O_AL_006.SEN3

- **S3B**

S3B_SR_2_CCT_AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC01AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC02AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC03AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC04AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC05AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC06AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC07AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC08AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC09AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_IC10AX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_SSBLAX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR_2_SSBSAX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
S3B_SR___CHDNAX_20180425T000000_20991231T235959_20190402T120000_____MPC_O_AL_004.SEN3
S3B_SR___CHDRAX_20180425T000000_20991231T235959_20190402T120000_____MPC_O_AL_004.SEN3
S3B_SR_2_CON_AX_20180425T000000_20991231T235959_20191120T120000_____MPC_O_AL_006.SEN3
S3B_MW___CHDNAX_20180425T000000_20991231T235959_20181116T120000_____MPC_O_AL_002.SEN3
S3B_MW___CHDRAX_20180425T000000_20991231T235959_20181116T120000_____MPC_O_AL_002.SEN3

Products Availability

☒ Copernicus Online Data Access (https://codarep.eumetsat.int) , SRAL L2 NTC Reprocessed Dataset

☒ Copernicus Online Data Access (https://coda.eumetsat.int), NRT, STC and NTC (see details below)

☒ EUMETCast (https://eoportal.eumetsat.int), NRT, STC (see details below)

☒ EUMETSAT Data Centre (https://eoportal.eumetsat.int) , NRT, STC and NTC (see details below)

EUMETSAT Online Data Access (ftp://oda.eumetsat.int), NRT, STC and NTC (see details below)

Product	EUMETCast	ODA*	CODA**	CODAREP**	EUMETSAT Data Centre
L2 Marine Products *(SR_2_WAT)*	NRT STC	NRT STC NTC	NRT STC NTC	NTC Reprocessed data	NRT STC NTC

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

***** CODA** and **CODAREP** are available to all users*

Please note that data processed with older versions of the Baseline Collection/Processing Baseline are still available in CODA/Data Centre – It is not recommended to use them.

Any other useful information

- NRT products are 10 minutes length
- STC and NTC products are pole to pole
- Reprocessed products are pole to pole; they are produced with the same ADFs used for NTC and can be easily distinguished from the operational NTC thanks to the letter "**R"** in the last part of the filename (MAR_**R**_NT_004.SEN3)

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 - SRAL and MWR Level 1 products

S3IPF.PDS.003.1, Issue 2.13, Date 29/05/2020

Product Data Format Specification - SRAL/MWR Level 2 Marine products

S3IPF.PDS.003.3, Issue: 2.14, Date: 29/03/2019

Sentinel-3 SRAL Marine User Handbook

EUM/OPS-SEN3/MAN/17/920901, Issue: v1A, Date 12/12/2017

All Sentinel-3 Altimetry documents are available in the EUMTSAT site:

sral.eumetsat.int

ANNEX – Historical PB information

Following is an archive of historical changes/anomalies/notices relevant to previous data still available to the users from the "Spring 2018" reprocessing (PB 2.27) and operational version thereafter (PB 2.33/1.33), and other operational changes made between the "Spring 2018" reprocessing and the introduction of PB 2.61. This information is also relevant to those upgrading from the data from those previous versions to the current PB 2.61.

Previous PBs Changes

New in PB 2.61 w.r.t. PB 2.45

- Filtered Ionospheric correction
- Correction of a software issue for 20-Hz SWH
- Update of Mean Sea Surface (MSS) to DTU18
- Update of FES2014 Tide Model library to the latest version of the library
- Improved Wind Model for very low/high wind speeds
- Update of the Characterisation of Sentinel-3 SRAL/MWR instruments:
    - SRAL Antenna Aperture 3dB and Internal Path delays
    - MWR Antenna Patterns

New in PB 2.45 w.r.t. to PB 2.33/1.13

- Improvement of sea-ice retrievals, including freeboard;
- Improved SWH, to better match with ECMWF's model. This is due to an updated *SR_2_LUTSAX* ADF specific for S3;
- Finer distance to coast field, useful for coastal studies. The ADF *SR_2_SHD_AX* was updated.
- Other minor anomalies and run-time errors fixed (see below)

New in PB 1.13 (impacting S3B only) w.r.t. to PB 2.33

- Correction of issues noted during S3B commissioning:
    - Bias is sigma0 w.r.t. to S3A in Ku and C bands:
        - This generated incorrect wind speed retrieval and incorrect flagging of rain
    - Fine tuning of the MWR brightness temperatures in order to align it to S3A:
        - It was visible in the radiometer wet tropospheric correction as a few millimeters difference that has now been corrected for.

Note that the commissioning data is currently only available to the commissioning team and S3VT users, a future reprocessing is planned with a release of a full coherent dataset for S3B to all users.

Evolutions of the Sentinel-3 ground segment

Some evolutions of the Sentinel-3 ground segment were not specifically linked to new versions of the processors and come from other components or data sources. The following evolutions are relevant to end users still using the previously reprocessed dataset (PB 2.27) or operational data thereafter (PB 2.33/1.33). This is no longer relevant for users of PB 2.68-MARINE:

- Improved orbit quality in STC:

Since 2018-05-28 the STC orbits have been generated by CNES/SALP using not just DORIS but also GNSS data. This allows for better orbit quality and less differences when comparing to the NTC orbits.

- Updated standard for CNES orbits (POE-F):

Since cycle 38 of S3A (STC and NTC) the orbits solutions generated by CNES/SALP use the new standard POE-F.

- Improved cut of the pole to pole pass (and pass numbering and ANX crossing time):

The information on when to cut to the pole to pole passes (STC and NTC) is derived from several system components that were fixed at different points in time. Since 2018-09-20 the situation was completely fixed for L1 and L2. The reprocessed dataset is already correct.

- Improved data quality at pass transition (STC and NTC):

The data present in L1/L2 passes had a degradation at pass transition, due to the fact that adjacent granules were not provided to the processor. This degradation has been corrected since 2018-11-27.

• Notices on the products

The following Notices apply to PB 2.27 or PB 2.33/1.33 and were corrected prior to PB 2.61.

- **Notice #12 – OCOG retracker to be better tuned for C band**
  ("EUM/Sen3/NCR/3970")

The fields OCOG retracker range (*range_ocog_20_c*) and Sigma Nought in C Band (*sig0_ocog_20_c)* are set to _FillValue at a higher rate than expected over Open Ocean. Further parameterization of the OCOG retracker is needed and will be done in a future version of the IPF.

Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Notice #13 - Bad Handling of _FillValue for the field amplitude_ocean_20_plrm_ku**
  ("EUM/Sen3/NCR/3972")

The SRAL L2 field amplitude_ocean_20_plrm_ku (stored in the enhanced product) is affected by numerical overflow (i.e. padded to _FillValue) when it takes values above 2147.483647

Affects: L2 SRAL NRT/STC/NTC Enhanced datasets.

Corrected since PB 2.45; previous data processed may exhibit the issue.

- ## History of Closed Anomalies

The following Anomalies were fixed prior to PB 2.68-MARINE, i.e. in PB 2.61, PB 2.45 or PB 2.33/1.33.

➢ Anomalies closed in PB 2.61

- **Anomaly "EUM/Sen3/AR/5128" – SSHA PLRM computed using SAR SSB**

  When the SSHA PLRM (*ssha_01_plrm_ku*) is computed, the SSB correction is *ssb_01_ku* instead of *ssb_01_plrm_ku*, meaning that it is computed with SAR SWH instead of PLRM SWH.

  Affects: L2 SRAL NRT/STC/NTC

  Corrected with PB 2.61; data processed with previous PBs exhibit this issue.

- **Anomalies "EUM/Sen3/AR/5226" and "EUM/Sen3/NCR/5102" – Pass number anomalies**

  On same cases the same pass number is given to different products. The pass number 771 is also attribute in error to a product, limit is 770.

  Affects: L2 SRAL STC/NTC

  Corrected with this PB 2.61; data processed with previous PBs may exhibit the issue.

➢ Anomalies closed in PB 2.45

- **Anomaly "EUM/Sen3/NCR/4145" - S3 STM L2 WAT: Errors in the some NetCDF comments in the enhanced measurements**
  - the field (enhanced_measurements.nc) *tracker_range_20_plrm_ku* in the NetCDF comment reports that this quantity is corrected for *uso_cor_20_plrm_ku* but this is wrong because the field *uso_cor_20_plrm_ku* does not exist (it should be *uso_cor_20_c*);
  - the fields (enhanced_measurements.nc) *net_instr_cor_range_20_plrm_ku*, *net_instr_cor_range_20_ku* , and *net_instr_cor_range_20_c* in the NetCDF comment report that they are corrected for the Doppler Correction (*dop_cor_20_*) but this is untrue because from the L2 STM DPM specifications, it is clear that they are corrected only for the L2 Doppler Correction update (i.e. *dop_cor_20_ – dop_cor_l1b_20*);
  - the fields (enhanced_measurements.nc) *net_instr_cor_sig0_20_c*, *net_instr_cor_sig0_20_ku*, and *net_instr_cor_sig0_20_plrm_ku* in the NetCDF comment report that they are corrected for the atmospheric attenuation correction (*atm_cor_sig0_*)

  Affects: L2 SRAL NRT/STC/NTC Enhanced measurements.

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/AR/4666" - SRAL L2 - netcdf variable (rad_along_track_avg_flag_01) does not follow specification**

The comment in the variable rad_along_track_avg_flag_01 does not match the one in the product spec. In the product spec the allowed values are (0-3) and in the comment (0-1).

Affects: L2 SRAL NRT/STC/NTC

Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "SIIIMPC-2244, EUM/Sen3/AR/5071" - L2 sea ice freeboard is predominantly negative**

  The sea ice freeboard (freeboard_20_ku) present in the L2 products is mostly negative, when it is expected to be naturally positive.

  Affects: L2 SRAL NRT/STC/NTC

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/NCR/4779" - IPF reports spurious gaps**

  The gaps reported in the SRAL L2 manifest are incorrect in some cases.
  The IPF appears to be actually mixing the application of the land sea mask and very small gaps, turning them into very large (spurious) gaps.

  Affects: L2 SRAL NRT/STC/NTC

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "SIIIMPC-2413, EUM/Sen3/AR/5071" - Wrong values of interpolated sea ice SSHA over ocean**

  Values of interpolated SSHA (int_sea_ice_ssha_20_ku) show stronger magnitude than the original sea ice SSHA: it is the case in the northern part of Canada where the interpolation process appears to introduce some anomalies

  Affects: L2 SRAL NRT/STC/NTC

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/NCR/4906" - Variable 'orbit_type_01' not properly filled if orbit used is NAVATT**

  The variable 'orbit_type_01' should provide the orbit type used in the computation. When the orbit used in TM_0_NAT (NAVATT) the flag is set to default value.

  Affects: L2 SRAL NRT/STC/NTC

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/AR/4697" - Acquisition station is reported in the manifest but not in the Netcdf**

The Netcdf products (standard_measurement.nc for L2 and measurement.nc for L1B) have the acquisition station set to "" (null).
However, this information is present in the manifests of the product.

Affects: L1 and L2 SRAL NRT/STC/NTC

Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "SIIIMPC-2412, EUM/Sen3/AR/5071" – Altimeter derived discrimination flag set to ocean over land**

  In certain cases the flag *surf_type_class_20_ku* is set to ocean over land surface in L2 products.

  Affects: L2 SRAL NRT/STC/NTC

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/NCR/4167" - S3A STM L2 Water: the fields range_ocog_20_ku and sig0_ocog_20_ku are often (around 7%) set to _FillValue in LRM mode over open ocean;**

  Affects: L2 SRAL NRT/STC/NTC in LRM mode

  Corrected since PB 2.45; previous data processed may exhibit the issue.

- **Anomaly "EUM/Sen3/NCR/3448" - GIM Iono Correction occasionally set to _FillValue**

  The ionospheric GIM correction (*iono_cor_gim_01_ku*) can be set to _FillValue on certain products that cross the midnight boundary. The post-midnight period of the product will have the GIM iono correction set to the _FillValue.

  Affected: L2 SRAL STC/NTC

  Corrected since 2018-09-20 (system fix)

S3A Anomalies closed in PB 2.33

- **Anomaly "EUM/Sen3/AR/3404" – ANX cross time not accurately computed**

  An error has been detected in the computation of the Ascending Node Crossing (ANX) time that leads to an error of up to 8 seconds in the equator crossing time. This affects L1 and L2. This ANX value is also used internally to generate the start/stop times of the pole to pole passes (STC and NTC), so those too were off by numerous seconds.

  Anomalies affected S3A data processed with previous versions. S3B data were not affected.

- **Anomaly "EUM/Sen3/AR/3953" - 5 millimeter bias between zero-altitude dry tropo correction (*mod_dry_tropo_zero_altitude_01*) and measured dry tropo correction (*mod_dry_tropo_meas_altitude_01*)**

This is anomalous because the two dry tropo corrections should be unbiased over open ocean (which is indeed around zero-altitude).

Anomalies affected S3A data processed with previous versions. S3B data were not affected.

- **Anomalies affecting the early mission data for S3A acquired in LRM, available as part of the "Spring Reprocessing 2018" produced with IPF SM-2 version 06.12.**

  - **"EUM/Sen3/NCR/4164"** - S3A STM L2 Water: the field *elevation_ocog_20_ku* is always set to _FillValue in LRM mode;

  - **"EUM/Sen3/NCR/4165"** - S3A STM L2 Water: the field *ssha_20_ku* is always set to _FillValue in LRM mode; this occurs because the field *iono_cor_alt_20_ku* (iono dual frequency correction) is always set to Fill Value;
  - **"EUM/Sen3/NCR/4166"** - S3A STM L2 Water: the field *elevation_ice_sheet_20_ku* is set very often (99.99%) to _FillValue in LRM mode. Valid values are expected because the field "range_ice_sheet_20_ku" takes valid values in LRM mode;
  - **"EUM/Sen3/NCR/4144"** - S3A STM L2 WAT: Sea Ice Concentration (*sea_ice_concentration_20_ku*), Snow Depth (*snow_depth_20_ku*), Snow Density (*snow_density_20_ku*) fields are always set to _FillValue in LRM mode.

  Anomalies closed in PB 2.33 (IPF SM-2 v06.14).

- **Limited time anomalies**

The following Limited time anomalies apply to previously released data (PB 2.27, 2.33/1.33 or PB 2.45), and where fixed in the reprocessed data (PB 2.61).

- **Anomaly "EUM/Sen3/NCR/2893" – Degradation of model dry and wet tropospheric correction during the day 2017-02-08**

  Due to unavailability of a meteorological correction file (AX___MA2_AX) during the day 2017-02-08, the model dry (*mod_dry_tropo_cor*) and wet tropospheric correction (*mod_dry_tropo_cor*) are degraded in that day. Since the dry tropospheric correction is directly used to compute sea level anomaly, the measurement of the sea level anomaly (*ssha*) is slightly degraded on 2017-02-08. It affected the STC and NTC data with the sensing of 2017-02-08. The issue is not present in the latest reprocessed data.

- **Anomaly "EUM/Sen3/AR/4993" - S3B STC/NTC passes are not properly cut during drift**

  During the drift phase, the pass duration in STC and NTC was not properly calculated and this led to slight offset in start/stop times of the passes.
  The offset value varies during the drift, up to a 5 seconds difference with the real pole crossing.

  Affects: L2 SRAL STC/NTC, but not reprocessed NTC

End of the Product Notice