



Copernicus S3 Product Notice – Altimetry

Mission	
Mission	S3A & S3B
Sensor	SRAL
Product	L1 NRT, STC and NTC
Product Notice ID	
Product Notice ID	S3.PN-STM-L1.07
Issue/Rev Date	17/12/2019
Version	1.0
Preparation	This Product Notice was prepared by the S3 Mission Performance Centre and by ESA and EUMETSAT experts
Approval	Joint ESA-EUM Mission Management

Summary

This is a Product Notice (PN) for the Copernicus Sentinel-3A and Sentinel-3B Surface Topography Mission (STM) Level-1A, Level-1BS and Level-1B products. The Product Notice is applicable to all timeliness: Near Real Time (NRT), Short Time Critical (STC) and Non-Time Critical (NTC), but please note that L1A and L1B-S are only produced in STC and NTC and they are not produced when the SRAL instrument is operated in LRM mode.

The Notice describes the Level-1 current status, product quality and limitations, and product availability status.



Processing Baseline

	S3A	S3B
Processing Baseline including ADFs	<ul style="list-style-type: none"> Processing Baseline: 2.61 	<ul style="list-style-type: none"> Processing Baseline: 1.33
	Some Static Auxiliary Data Files (ADFs), which are instrument specific, are different between S3A and S3B. The processor version is the same.	
IPFs version	<ul style="list-style-type: none"> SR_1 IPF version: 06.17 	

Current Operational Processing Baseline

IPF	IPF Version	In OPE since
S3A SR1	06.17	Land Centres: 2020-01-21 Marine Centre: 2020-01-21
S3B SR1		Land Centre: 2020-01-21 Marine Centre: 2020-01-21

Status of the Processing Baseline

Sentinel-3

The same processors and versions are used for S3A and S3B:

- SRAL L1 IPF (SR-1): version 06.17

Some Static Auxiliary Data Files (ADFs), which are instrument specific, are different between S3A and S3B. The list of ADFs can be found at the end of the document.



The collection of IPF version and ADFs is known as Processing Baseline (PB). For S3A the PB number is 2.61 and for S3B is 1.33. Currently these numbers are internal to the PDGS; only IPF version and ADFs names/versions are available in the products.

The quality of L1 products is within the mission requirements.

Note that since IPF version 06.09 the L1 products are generated with internal netcdf4 compression enabled. This is transparent to the user.

The deployment dates in the Land and Marine Centres are specified above.

Known product quality limitations

Common to S3A and S3B

The Copernicus Sentinel-3A and Sentinel-3B STM products have some known processing limitations, which are reported in the next pages.

Anomaly#S3-1: L1 Sigma0 scale does not take into account the azimuth compression gain (SIIMPC-2927):

- Since IPF version 06.17, the azimuth compression gain is taken into account in the L1 processing, its expression is given by $10 \cdot \log_{10}(64)$ has an impact on the backscatter coefficient absolute bias. For ocean retracker it is taken into account in the IPF L2 (see corresponding product notice), for the other retracker, the sigma0 mean value is reduced by 18.06 dB
- Fixed in version SRAL SR-1 06.17

Anomaly#S3-2: Wrong information in Level-1A coordinates attribute for variable agc_ku_l1a_echo_sar_ku (SIIMPC-3265):

- The coordinates attribute of agc_ku_l1a_echo_sar_ku field in the L1-A products was wrong it was modified accordingly:

From "lon_l1b_echo_sar_ku" to "lon_l1a_echo_sar_ku"

From "lat_l1b_echo_sar_ku" to "lat_l1a_echo_sar_ku"

- Fixed in version SRAL SR-1 06.17



Notice #S3-1: Longer calibration time window:

- Since IPF version 06.13 the time window of the on-board calibrations (CAL2) applied to the measurement data has been extended within the ground processing: both Ku and C band use a 27 days average calibration. This provides smoother calibration and less day-to-day variations in the scientific data.

Notice #S3-2: Number of beams in the stack:

- The number of stack beams to build the 20 Hz waveform is set to 180. All the useful beams in the stack are used.

Notice #S3-3: The CAL1 PTR Power is noisy (“EUM/Sen3/AR/3311”):

- Since IPF version 06.13, the noise present on the SRAL CAL1 PTR (Point Target Response) power has been reduced thanks to the application of an averaged CAL2 correction. Note that it has no impact on the scientific data in Ku-band and a small effect in C-band.

Notice #S3-4: C Band CAL2 Filter Mask is quite noisy (“EUM/Sen3/AR/3739”):

- It is observed that the CAL2 Filter mask in C Band has still a high level of speckle noise. Since IPF version 06.13, the CAL2 Filter mask in Ku Band is used for processing the C-band parameters.

Notice#S3-5: SRAL acquisition mode in L1 products (SIIMPC-2065):

- Since IPF version 06.14, the SRAL data during which SRAL altimeter operates in acquisition mode are available in the SRAL Level 1 SAFE products. All these data are gathered in a separate NetCDF file named as follows “acquisition.nc”. Note that this evolution has no impact on the measurement file “measurement.nc”. When no acquisition information is available, no “acquisition.nc” file is available.

Notice#S3-7: Update in the S3A&S3B SRAL Ku Band Antenna Pattern 3dB beamwidths:

- Since PB 2.61A/1.33B, the Ku Band Antenna Pattern 3dB beamwidths have been updated for S3A and S3B SRAL sensors. The new values are 1.34 degrees for S3A SRAL and 1.33 degrees for S3B SRAL. The former value was 1.35 degrees for both S3A and S3B SRAL.



Specific to S3A

The Copernicus Sentinel-3A STM products have some known processing limitations, which are reported in the next pages.

Anomaly #S3A-3: EUM/Sen3/AR/3404: Issue in L0 IPF in computing the ANX Cross Time (SIIMPC 1918)

- An error has been detected in the computation of the ANX time that leads to an error of up to 8 seconds in the equator crossing time. This currently affects L1 and L2. This ANX value is used internally to generate the start/stop times of the pole-to-pole passes (STC and NTC) which was now improved.
- Fixed in version 06.14

Specific to S3B

The Copernicus Sentinel-3B STM products have some known processing limitations, which are reported in the next pages.

Anomaly #S3B-1: Track numbering exceeds maximum number during drifting phase (SIIMPC-2825)

- During the drifting phase between 8 May and 6 June 2018, track numbering exceeds 770, which is the nominal track number for Sentinel-3 27 day repeat cycle.
- Affects S3B data during the drifting phase. It will be corrected in the next reprocessing.

Anomaly #S3B-2: Degraded SRAL calibration quality for S3B between 6 June and 21 June 2018 (SIIMPC-2823)

- Due to different parameterisation of SRAL commanding on board, SRAL Level 1 products acquired between 7 June and 21 June have been processed with old CAL1 data.
- The impact on the L1 and L2 data is negligible.

Anomaly #S3B-3 "S3B STC/NTC passes are not properly cut during drift" (EUM/Sen3/AR/4993)

- During the drift phase, the pass duration in STC and NTC was not properly calculated and this lead 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.
- This anomaly will be corrected in the next reprocessing.



Notice #S3B-1: Jump on C-band S3B data due to different SRAL thermal conditions

- On the 29 May, due to different thermal conditions on SRAL sensor, a jump of 0.2 dB on the SRAL C-band CAL1 power value occurred.
- This calibration is averaged into a 10-day window and applied to L1 data. Thus between 29 May and 7 June 2018 the L2 science data is affected by this jump.
- No further mitigation actions are foreseen.

Notice #S3B-3: S3B waveforms are not centred on gate 44 in average

- When the navigation bulletin is derived from GNSS instrument instead of DORIS, a bias of -80 cm is observed on the epoch distribution. The impact on the L2 estimated parameters is very low (less than 1 cm on SARM SWH) and observable in SARM only. The navigation bulleting was derived from GNSS from 7th of July 2018 to 16th of July 2018 and from the 23rd of November 2018 to the 9th of May 2019.

Products Availability

- Copernicus Open Access Hub (<https://scihub.copernicus.eu/>), NRT, STC and NTC
- Copernicus Online Data Access (<https://codam.eumetsat.int/>), NRT, STC and NTC
- EUMETCast (<https://eoportal.eumetsat.int/>), NRT and STC
- EUMETSAT Data Centre (<https://eoportal.eumetsat.int/>), NRT, STC and NTC
- EUMETSAT Online Data Access (<ftp://oda.eumetsat.int/>), NRT, STC and NTC (see details below)
- FTP server address login: login password: password
- Other

Product	EUMETCast	ODA*	CODA**	EUMETSAT Data Centre
L1B	NRT, STC	NRT, STC, NTC	NRT, STC, NTC	NRT, STC, NTC
L1A	-	STC, NTC	STC, NTC	STC, NTC
L1BS	-	STC, NTC	STC, NTC	STC, NTC

* ODA is available only for Copernicus Services and S3VT users

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



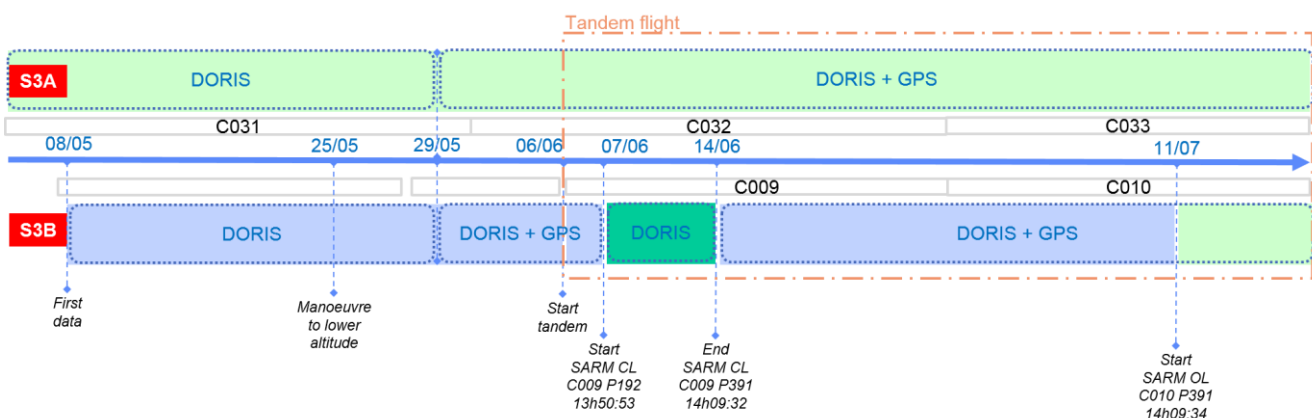
Any other useful information

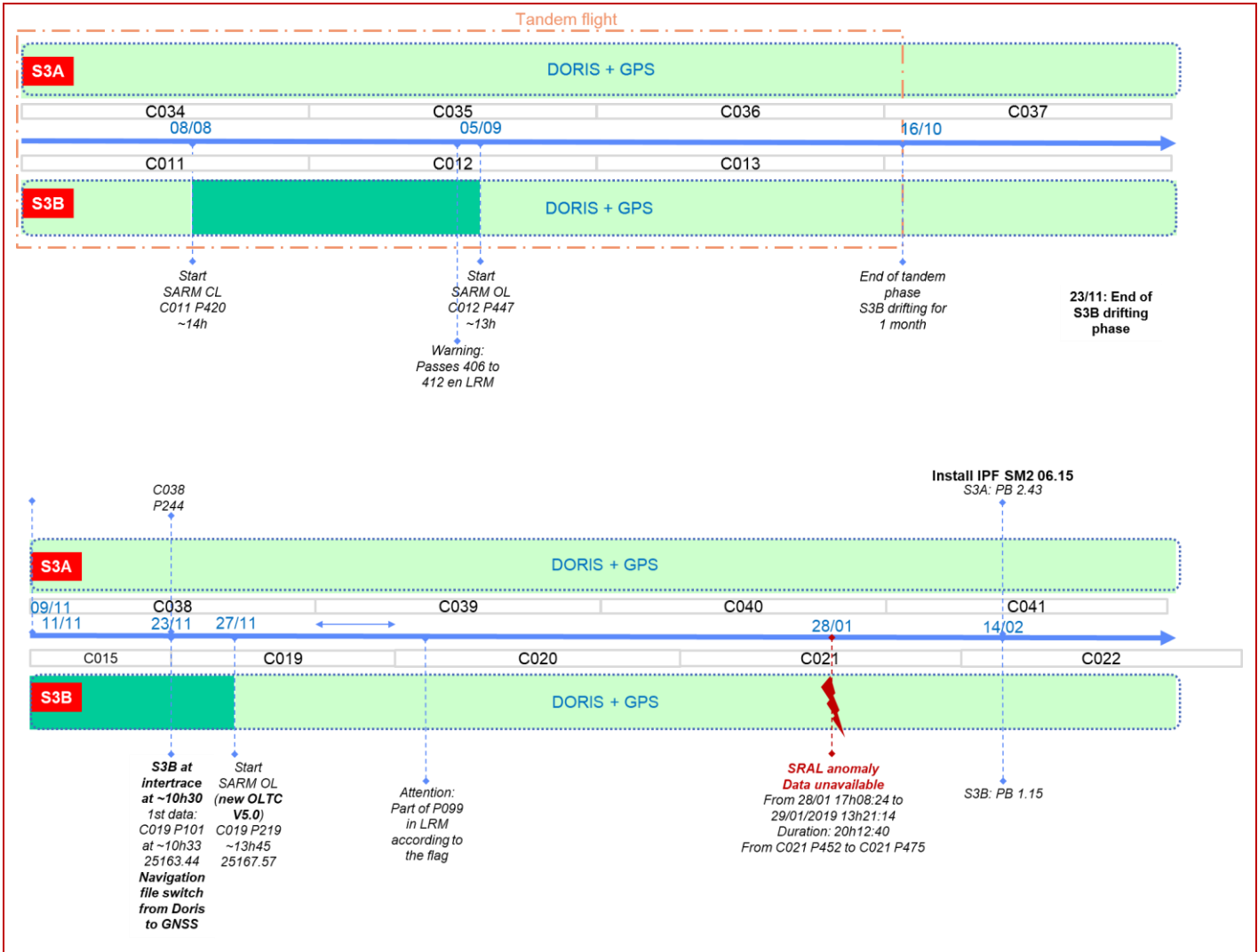
- Since IPF version 06.17, the baseline collection number in the products filename changed from 3 to 4 to reflect the major evolutions introduced by this Processing Baseline. As an example, the filename for STC products will be labeled as O_ST_004.SEN3 instead of O_ST_003.SEN3
- Note that the SRAL NRT products are 10 minutes length, instead of being dump based as originally specified – this is part of the new Product Definition.
- The fine tracker word is not applied in the L1B waveforms creating saw tooth behavior on the radargram. This is not considered an anomaly since the range can be computed using the tracker and epoch provided in the product or from the epoch coming from any external retracking applied by the users. All versions are impacted.
- For Sentinel-3B, SRAL was switched-on on 8 May. Until 6 June, the S3B satellite drifted in its orbit to end up 30 seconds ahead of the S3A satellite, at which point the tandem phase started.
- The geographic coverage of S3B mission was partial until 29 May 2018. Indeed, since the altimeter PRF was not changed during the drifting phase, there have been no SRAL acquisitions below 50°S until 24 May 2018, then partial coverage between 24 and 29 May.
- SRAL operated:
 - in LRM Closed Loop mode from 8 May till 6 June 2018;
 - in SAR Closed Loop mode from 7 June till 14 June 2018;
 - in LRM Closed Loop mode from 14 June till 11 July 2018;
 - in SAR Open Loop mode from 11 July till 8 August 2018;
 - in SAR Closed Loop mode from 8 August till 5 September 2018;
 - in SAR Open Loop mode since 5 September 2018;
 - in SAR Closed Loop mode since 2 October 2018;
 - in SAR Open Loop mode since 27 November 2018.
- S3B satellite reached its final orbit on 23 November 2018.
- Note that the strategy of cycle numbering during the S3B drifting phase is that the cycle number is incremented at each major satellite manoeuvre. This results in very short cycles from Cycle 2 to Cycle 8. Between Cycle 9 (start of the tandem phase) and cycle 13 (end of tandem phase), the repeat cycles have the nominal duration of 27 days. Then, cycles 14 to 17 are also shorter than 27 days during the second drifting phase needed to reach the final orbit.
- Since 28 May 2018, CNES MOE used in STC products have been improved by using Doris and GPS observations in the orbit solution. This improvement is present for both S3A and S3B.



- CNES MOE used in STC products were produced with Doris measurements only between 7 June and 14 June 2018. After 14 June, situation came back to nominal with orbit solution generated with both Doris and GPS measurements. This issue only affects S3B.
- Since 9th of November 2018, the Sentinel-3A and -3B MOE and POE orbit standards were upgraded to standard -F
- The Sentinel-3B onboard OLTC was updated (latest version 5.0) on the 27th of November 2018.
- The Sentinel-3A onboard OLTC was updated (latest version 5.0) on the 9th of March 2019. The Open/closed loop mask was updated accordingly to the Sentinel-3B one (ie: Open Loop acquisition below 60 degrees of latitude, Open Loop over ocean and Closed loop over land for latitudes above 60 degrees).
- Since 14th of June 2019, Sentinel-3B is switched to Open Loop Fixed Gain mode over the Svalbard Transponder.
- Since the 29th of June 2019, Sentinel-3A is switched to Open Loop Fixed Gain mode over the Svalbard Transponder.
- Between the 23rd of November and the 9th of May 2019, the Sentinel-3B navigation bulletin was derived from GNSS instrument. After this date it is derived from Doris instrument.

- SARM Open Loop
- SARM Closed Loop
- LRM





User Support

- Questions about STM products can be asked to the Sentinel-3 User Support desk at:

eosupport@copernicus.esa.int

ops@eumetsat.int



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, Ref: S3IPF.PDS.003.1, Issue: 2.11, Date: 18/04/2018
<https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-altimetry/document-library>

Static ADFs List.

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

S3A/S3B 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_1_CONCAX_20160216T000000_20991231T235959_20171130T120000_____MPC_O_AL_003.SEN3
- S3A_SR_1_CONMAX_20160216T000000_20991231T235959_20180213T120000_____MPC_O_AL_007.SEN3
- S3A_SR__CHDRAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_005.SEN3
- S3A_SR__CHDNAX_20160216T000000_20991231T235959_20190402T120000_____MPC_O_AL_005.SEN3

S3B:

- S3B_SR_1_CONCAX_20180425T000000_20991231T235959_20180409T120000_____MPC_O_AL_001.SEN3
- S3B_SR_1_CONMAX_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

End of the Product Notice