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→ 25 YEARS OF PROGRESS IN RADAR ALTIMETRY SYMPOSIUM

24–29 September 2018 Ponta Delgada, São Miguel Island Azores Archipelago, Portugal Sentinel-3B commissioning: First results from the Level 2 Marine Products

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Context



2. EUM/RSP/V

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SSHA diff [m] – NTC – per pass collinear stats

0.02 ŤŤ 0.01 0.00 -0.01-0.02 -0.03 -0.04 -0.05 -0.06 SAR_CL SAR_CL 0.10 0.08 0.06 0.04 0.02 std dev (x:0.038 0.00 2018-06-18 2018-07-02 2018.07-16 2018-07-30 2018-08-13 2018-08-27 2 EUMETSAT 2018/09/27 07:20

3b-3a (.ntc0) ssha (diff per pass)

 In SAR Open Loop very little bias between S3B and S3A (~ –17 mm)

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- S3B LRM is biased higher by ~ 30 mm
- Small, but not insignificant bias between Closed Loop and Open Loop (~ 2 mm)

SSHA diff [m] – STC – per pass collinear stats



 Same steps can be seen in STC

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 Second Open Loop period consistent with the first





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SSHA – NTC – SAR Open Loop



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CAL1 PTR power noisier @ OL – CL transition

ptr pow c (10d running average **Ku-band CAL1** S3B_SR_1_CA1SAX_20000101T000000_20180917T070606_20180917T091931 MAR_O_AL .SEN3 [ptr_pow_ku] ptr pow ku (dB) [x:61.89908 o:0.0280 #540] ptr_pow_ku (10d running average 61.92 61.90 61.88 2018-05-17 2018-05-31 2018-06-14 2018-06-28 2018-08-09 2018-08-23 61.86 61.84 2018-05-17 2018-05-31 2018-06-14 2018.06.2 C-band CAL1

Explaining jumps?

 Checked all CAL1 and CAL2

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- Only strange behaviour is in PTR power
- Instantaneous jumps at LRM-SAR transitioning, but not between Closed and Open Loop
- Smooth transition in internal delay
- Nothing strange in CAL2



8. EUM/RSP/VWG/18/1024168

SWH diff [m] – NTC – per pass collinear stats



 In SAR Open Loop no bias between S3B and S3A (~ -4 mm)

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- S3B LRM is biased lower by ~ -14 mm and much noisier
- Small, but not insignificant bias between Closed Loop and Open Loop (~ 12 mm)



0 1 2 3

3a.ntc0 (x:2.5552 o:1.4507 #1139288)

5 6

Units are: m

 Strong regional differences (not only swell)

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-0.2

Diff (x:-0.0183 o:0.1955 #1055741)

0.0

Diff (3b.ntc0-3a.ntc0)

0.2

0.4

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10. EUM/RSP/VWG/18/1024168

-0.4

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90°5

SWH – NTC – SAR Open Loop

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SWH – NTC – SAR Closed Loop

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Sigma0 diff [dB] – NTC – per pass collinear stats

3b-3a (.ntc0) sig0 (diff per pass) 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 SAR CL SAR O SAR_CL 0.5 0.4 0.3 0.2 0.1 0.0 2018-08-13 2018-06-18 2018-07-02 2018-07-16 2018-07-30 2018-08-27 2 EUMETSAT 2018/09/27 07:20

 Significant bias between S3B and S3A (~ +0.53 dB)

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- In SAR Open Loop, some initial (though small) drift
 - Likely due to smoothing of CAL1 PTR power
- S3B LRM is biased lower by ~ 0.05 dB and much noisier
- Unexplained increase of RMS at beginning and end of Open/Closed Loop
 - Also due to CAL1 smoothing?

Sigma0 – NTC – LRM

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Sigma0 – NTC – SAR Open Loop

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Explanation for sigma0 bias

Harness losses

In S3B the harness losses (-0.24 dB) is considered only once (one-way) instead of twice (two way)

AGC correction on PTR power

- The AGC correction (a small correction to the integer AGC values) is not accounted for in computing the PTR power
- Values differ by –0.24 dB between S3B and S3A

Total effect

- Adds up to –0.48 dB, leaving only 0.05 dB bias between S3B and S3A
- Both can be corrected in processing by configuration change, but second should be fixed in processor code

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Wind speed diff [m/s] – NTC – per pass collinear stats

 Significant bias between S3B and S3A (~ -1.4 m/s)

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- In SAR Open Loop, some initial (though small) drift
 - Likely due to smoothing of CAL1 PTR power
- Consistent with sigma0 behaviour

Iono cor diff [m] – NTC – per pass collinear stats

 In SAR Open Loop significant bias between S3B and S3A (~ +12 mm)

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- S3B LRM is biased lower by ~ 2 mm
- Small, but perceptable bias between Closed Loop and Open Loop (~ 1 mm)

Wet Tropo RAD vs ECMWF – NTC – SAR Open Loop

S3B Cycle 10-11 SAR_OL (S3B (ntc0) vs S3A (ntc0)) wet tropospheric correction difference (MWR-ECMWF) (m)

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S3B bias with ECMWF ~ 9 mm

80

60 40 %

20

0

80

60

40

20

0

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- Likely due to wind speed error (on which wet tropo algorithm depends)
- S3A bias with ECMWF only ~ 2 mm % of mode

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Conclusions

Collinear results show very good agreement between S3B and S3A missions

SSH

- Bias is reduced from ~ -17 mm to -15 mm at NTC when tracker operational mode changes from OL to CL.
- All CAL LTM files checked during this transition. No anomalies observed other than:
 - CAL1 PTR Power Ku and C noisier during CL

SWH

 Perfect agreement in SWH results between the two missions except for unexpected jump at OL/CL transition

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Conclusions

- Backscatter shows a ~0.5 dB bias and a small short-lived drift
- Mean bias explained; can be fixed in processing configuration
- Drift is to be investigated

Wind speed

■ Shows a mean bias ~ -1.4 m/s, and a slight drift, equivalent to sigma0

Dual-frequency ionospheric correction

- Mean bias of –12 mm, result of ~70 mm C-band and 5 mm Ku-band bias
- Also exhibit jump at OL/CL transition

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Conclusions

Radiometer wet tropospheric correction

- Shows an 7 mm constant bias between missions
- S3A in better agreement with ECMWF
- Likely related to bias in wind speed

Open-closed loop COR2

- Showing a geographical pattern proportional to cos(2*lat)
- Applies to both S3A and S3B
- Pattern 4 times smaller with GNSS bulletin is used

Outlook

- No change to be made until end of tandem (16 October)
- Release of data after fix of major issues (late 2018)

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RADS editing criteria for L2 products

- in coastal zone (radiometer land flag)
- covered by sea ice
- impacted by rain
- Isea level anomaly > 3 m
- dry tropo correction < -2.4 m or > -2.1 m
- radiometer wet tropo correction < -0.6 m or > 0.0 m
- dual-frequency iono correction < -0.4 m or > 0.04 m
- |MOG2D DAC| > 0.4 m
- ocean tide > 5 m
- |SSB| > 1 m
- SWH > 8 m
- sigma0 < 6 dB or > 27 dB
- rms of 20-Hz range > 0.4 m
- rms of 20-Hz SWH > 2.1 m
- rms of 20-Hz sigma0 > 1 dB
- number of 20-Hz measurements to construct 1-Hz measurements < 17</p>

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