New Jason-2 GDR-C standards

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New Jason-2 GDR-C standards

- New J2 AMR processing (coastal area + new flags) and updates to work around the 34 GHz VFC anomaly
- Use of a null mispointing value in input of the C band retracking algorithm
- Use of LTM information filtered over X days
- New tide model (GOT00.2 ➔ GOT 4.7)
- Polar tide anomaly correction
- Long period non equilibrium tide anomaly correction
- SSHA computed when meteo grid are extrapolated (flag value to be checked = F Boy ??)
- NRT orbit quality flag in OGDR products
- Some complementary evolutions (specifications updates+ typos in the products + …)
- Update of the altimeter characterisation file and impacts
- Ice Flag in SSHA products
- New parameters in SGDR products (including all MLE3 derived parameters)

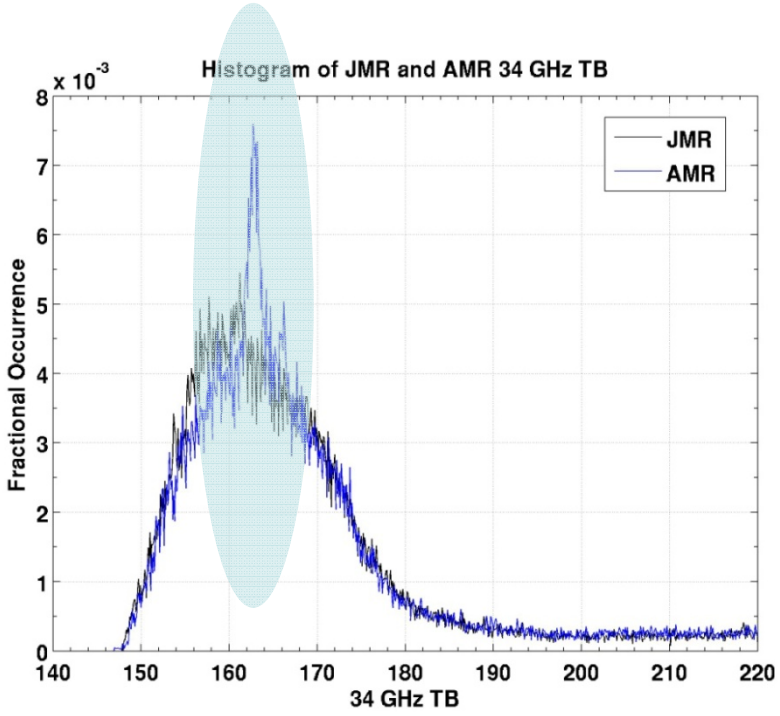
Studies :

- MLE3 and MLE4 instrumental correction tables
- Rain flag from MLE3 estimations
- Wind speed and SSB : comparison MLE3/MLE4

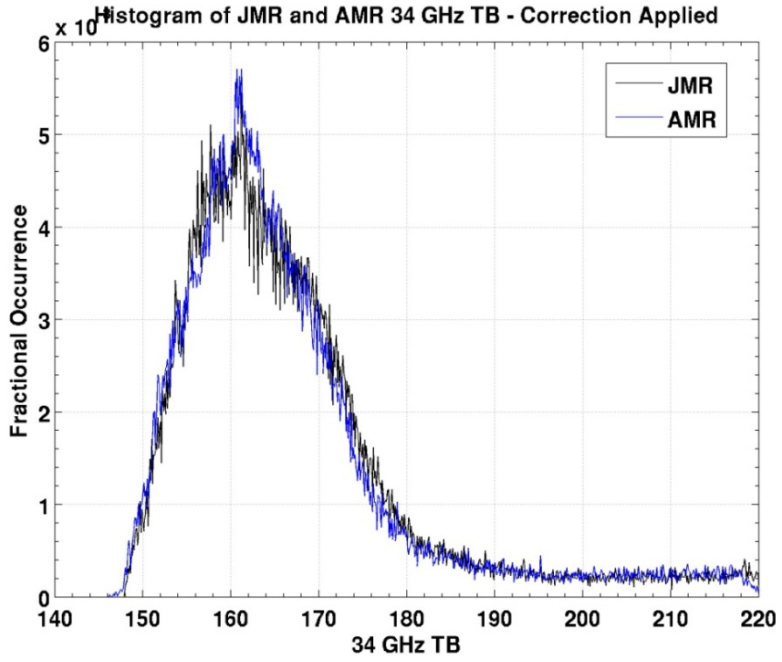
Analysis :

- Impact assessed on 3 cycles reprocessed mid September (64-66), not released to users.

New Jason-2 AMR processing (Jason-2) - Algorithms provided by JPL (S.Brown)
+ updated algorithms to work around the 34 GHz VFC anomaly
(anomalous spikes in the histogram of L1B TBs near 163 K)
+ new radiometer rain flag and radiometer ice flag

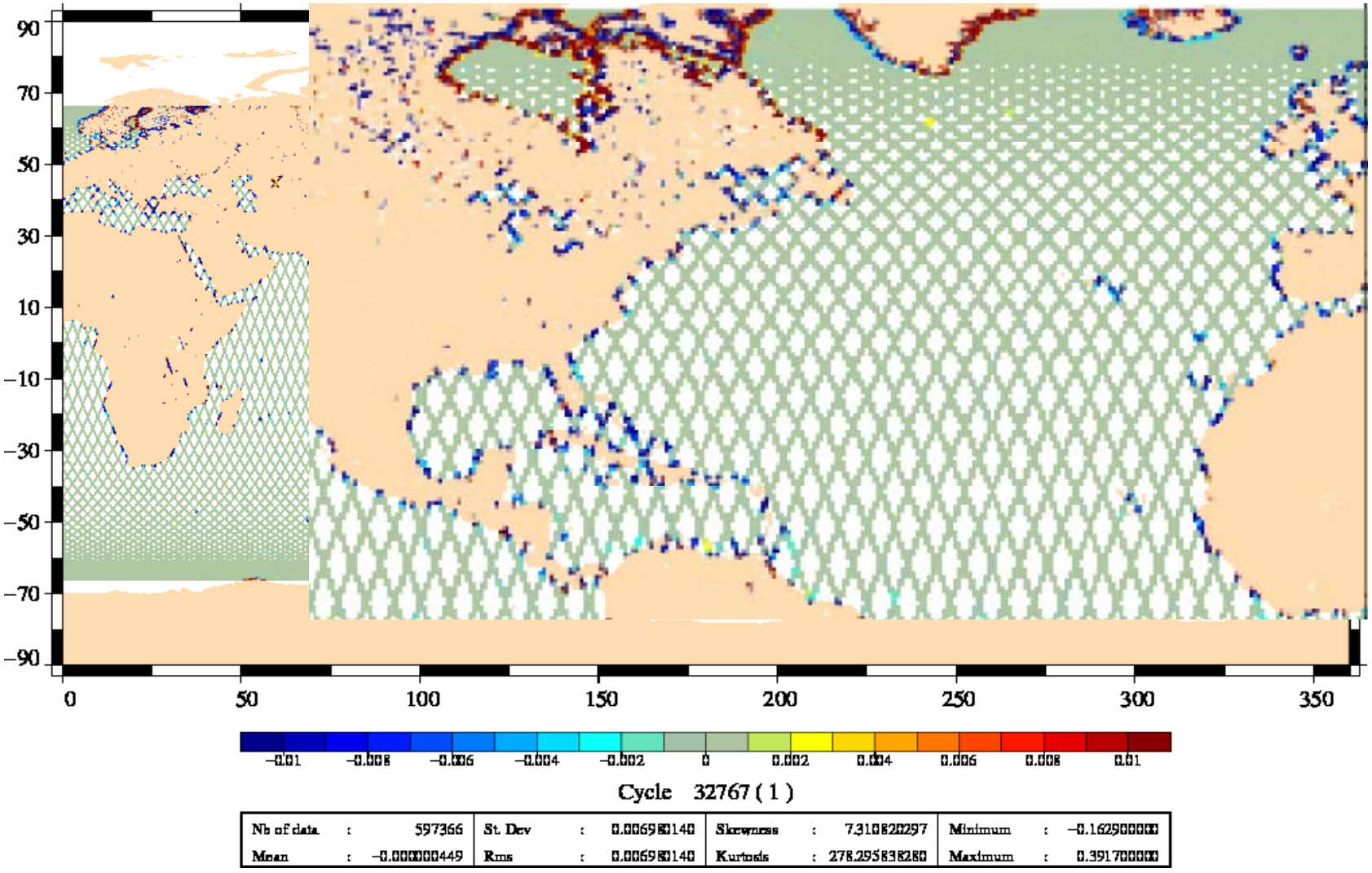


Before correction



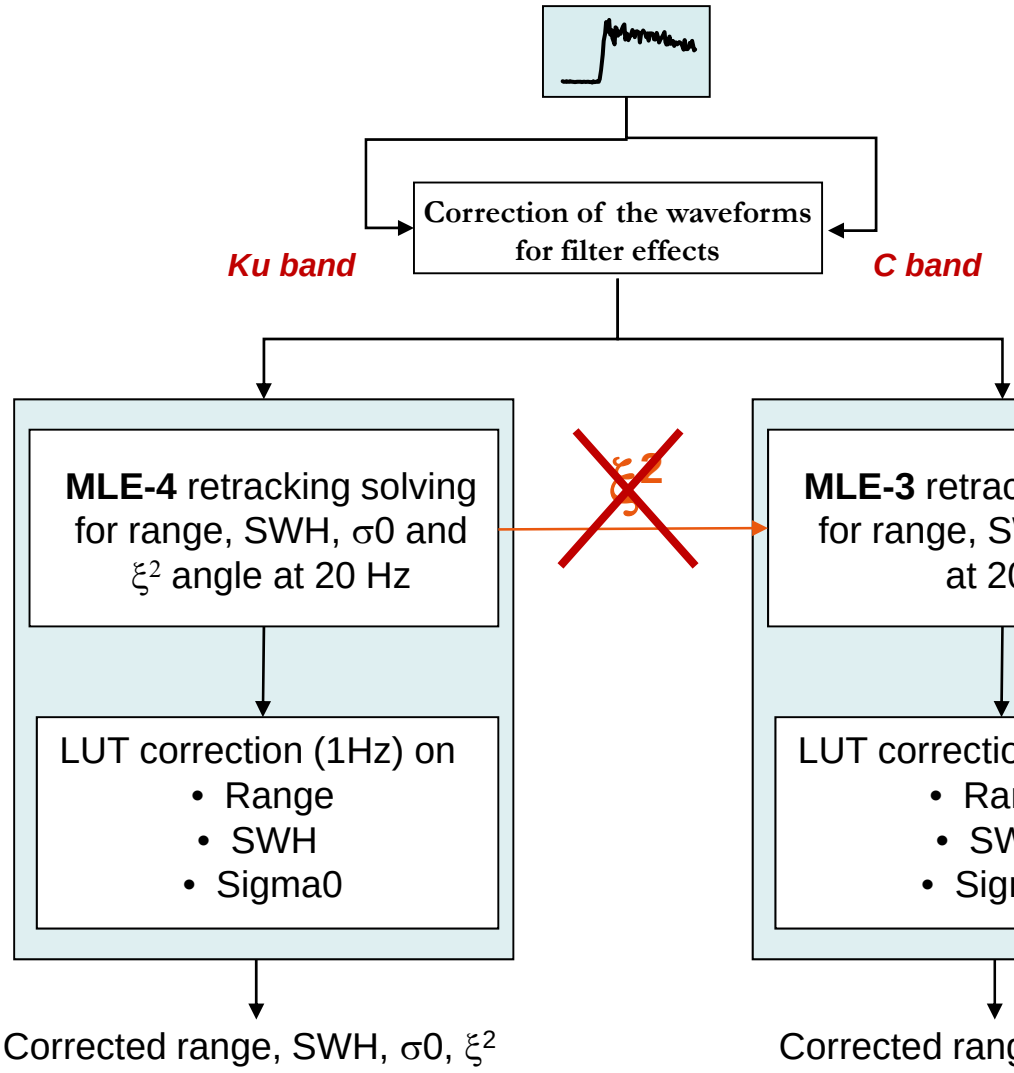
After correction

Impact on wet tropospheric correction (on cycle 64)



Map of differences of radiometer wet troposphere correction between GdrC and GdrT for cycle 064

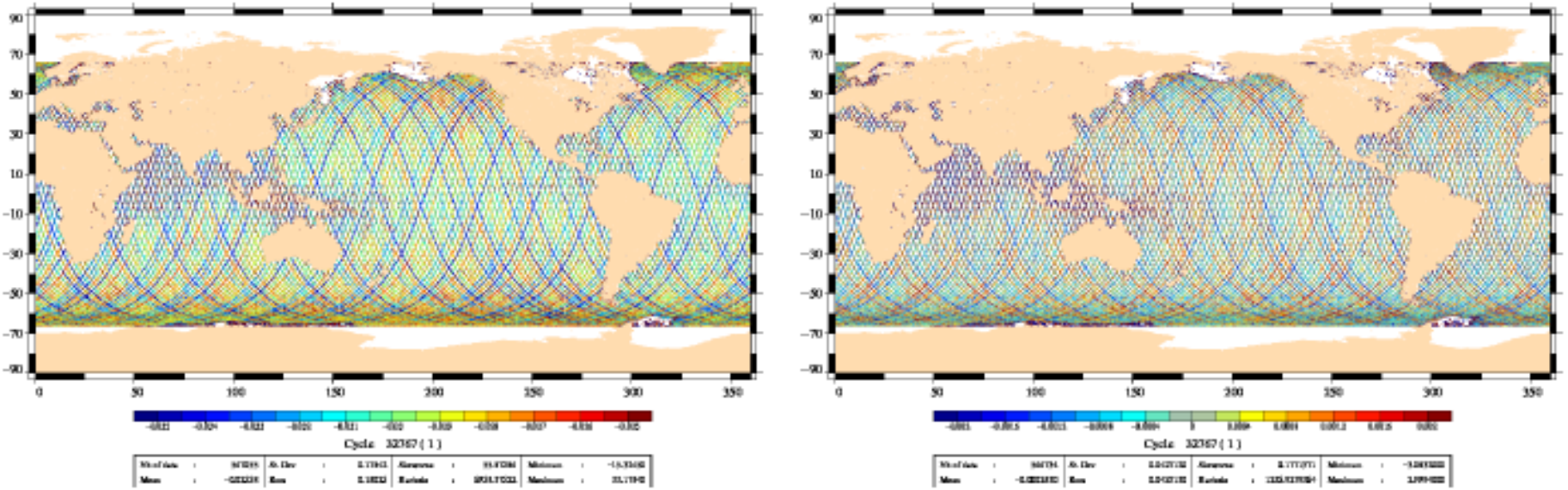
Use of a null mispointing value in input of the C band retracking algorithm



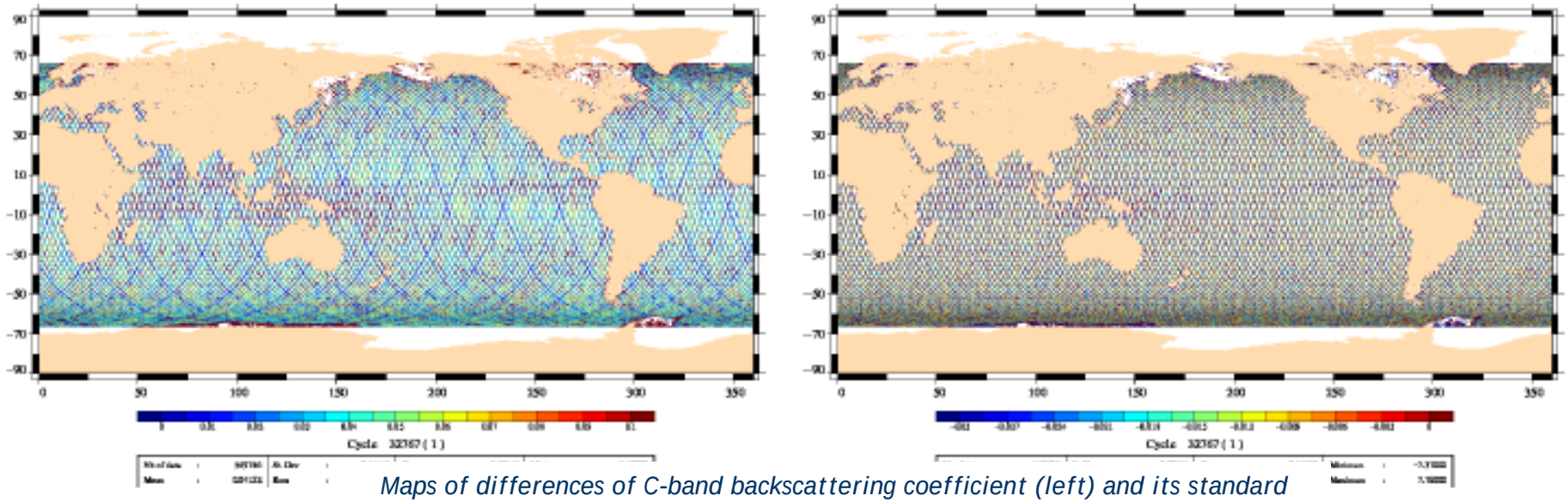
➔ The Ku-band mispointing angle was injected in C band retracking (identical to Jason-1)

➔**BUT** what was correct (and necessary) for J1, has been modified for J2 because J2 is well pointed (injection of Ku band mispointing only introduces noise in C band estimates without any estimation benefit)

Analyses on reprocessed data (GDR-C)

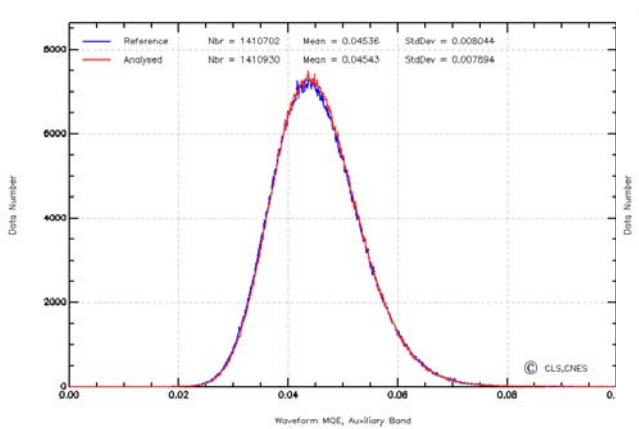


Maps of differences of C-band range (left) and its standard deviation (right) between GdrC and GdrT for Cycle 064.

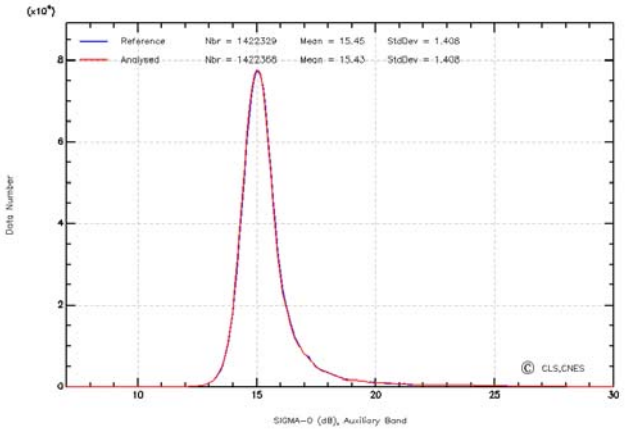


Maps of differences of C-band backscattering coefficient (left) and its standard deviation (right) between GdrC and GdrT for Cycle 064.

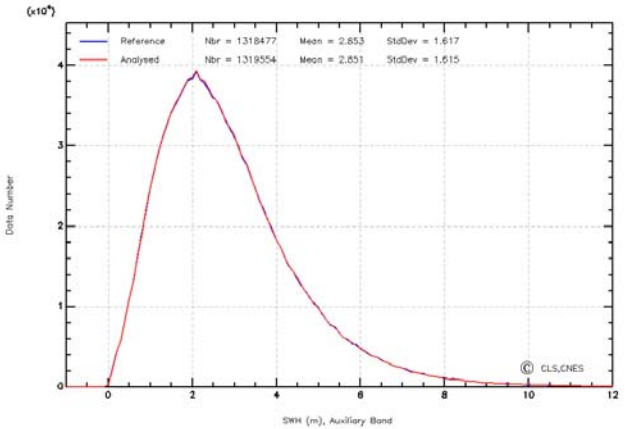
Analyses on reprocessed data (with constant filter over the 10 days)



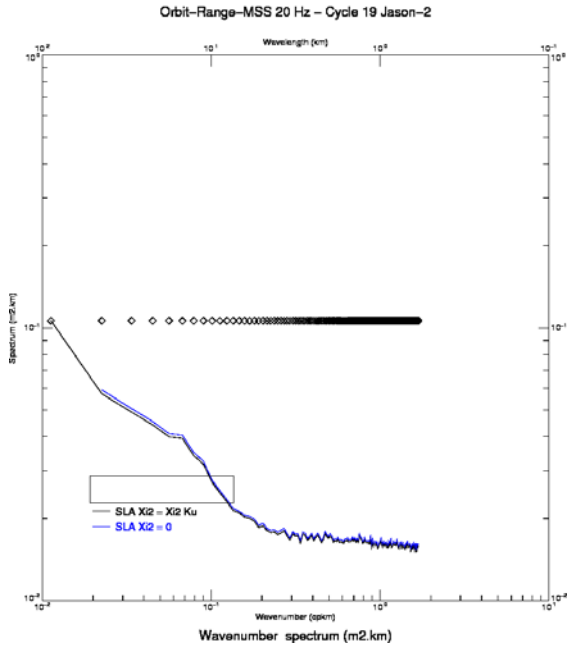
C–Band SLA Spectrum



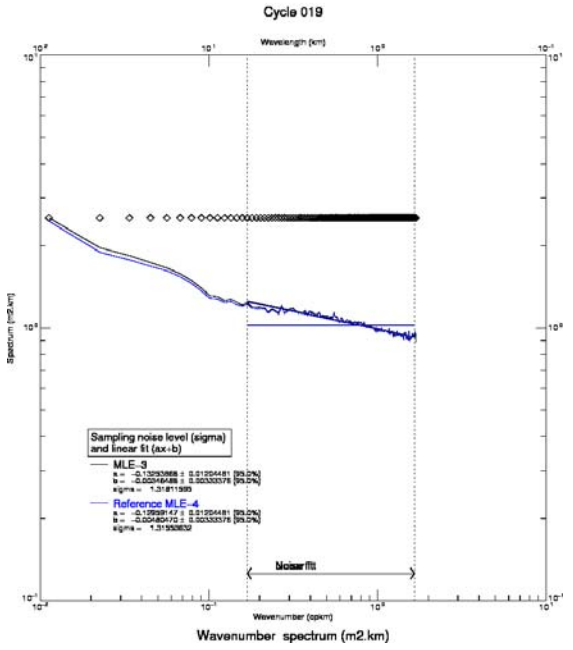
SWH Spectrum, Auxiliary Band



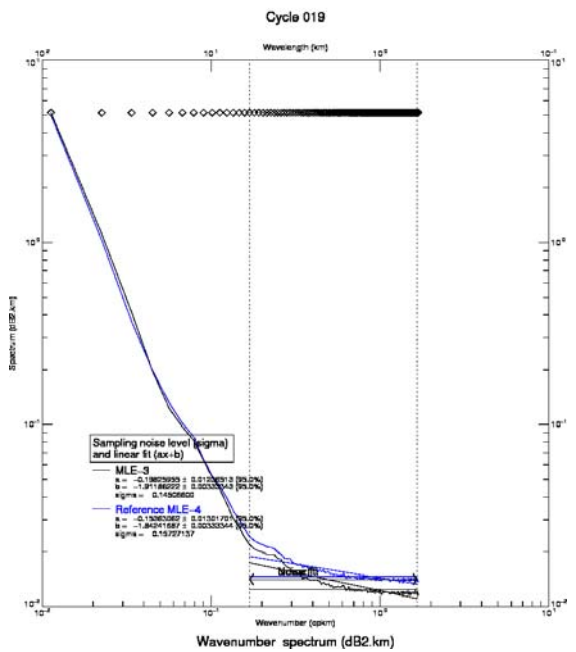
Sigma0 Spectrum, Auxiliary Band



Wavenumber spectrum (m2.km)



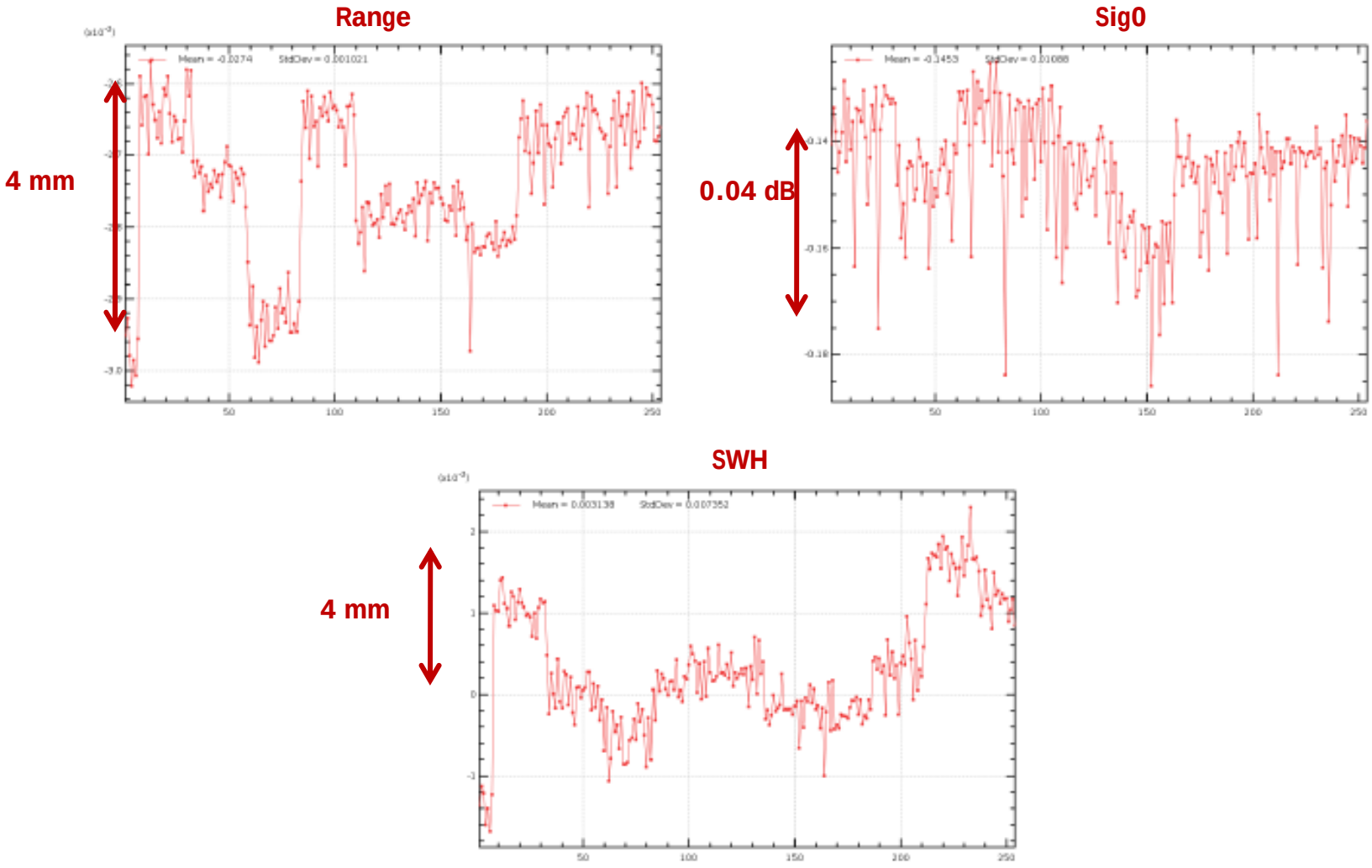
Wavenumber spectrum (m2.km)



Wavenumber spectrum (dB2.km)

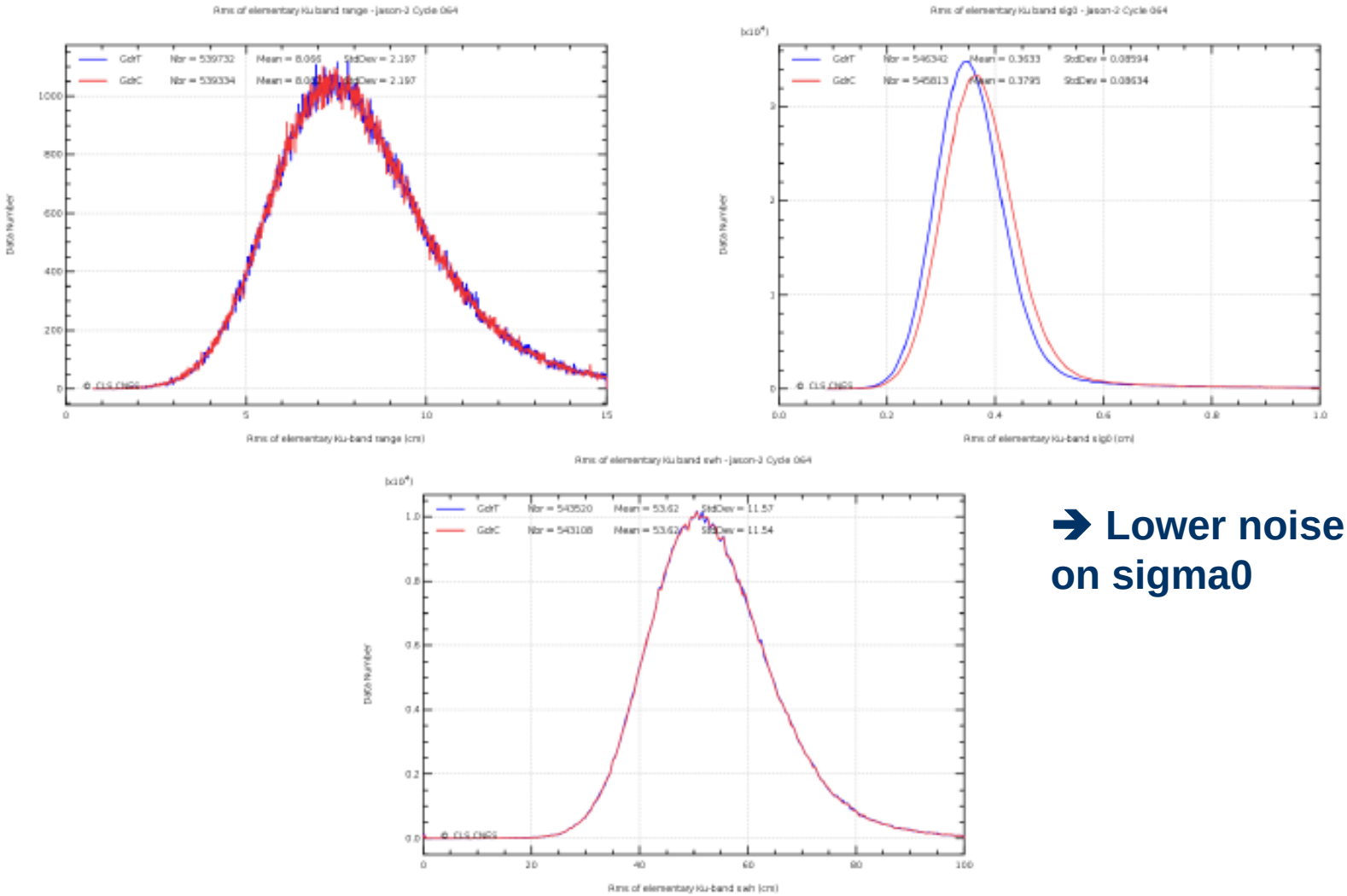
No impact on range and SWH. Small impact on the sigma0 noise level

Altimeter calibration file averaged over 10 days



Monitoring by pass of mean difference between GdrC and GdrT Ku-band range (left), backscattering coefficient (right) and waves (bottom).

Altimeter calibration file averaged over 10 days



➔ **Lower noise level on sigma0**

Histograms of GdrC and GdrT standard deviations of Ku-band range (left), backscattering coefficient (right) and waves (bottom).

New tide model (GOT00.2 ➔ GOT 4.7)

The new tide model GOT4.7 has been implemented to replace the GOT 00.2 model.

Polar tide correction

Over lakes and enclosed seas, the pole tide correction has been modified (now similar to what is done on earth surface)

Long period non equilibrium tide correction

A new algorithm has been developed to compute the long period non equilibrium tide correction which account for 12 waves (Mm, Mf , Mtm, Msqm, Mm', Mf', Mf'', Mf''', Mtm', Mtm'', Msqm', msqm') instead of 3 waves (Mm, Mf , Mtm).

OGDR SSHA when meteo grid are extrapolated

The SSHA is computed even if we have a degraded auxiliary data configuration (meteo file extrapolated)

NRT orbit quality flag in OGDR products

« orbit state flag: DIODE on-board software» has been replaced by « orbit state flag: TRIODE ephemeris score »

Ice Flag in SSHA products

The ice flag already present in O/I/GDR products has been added in SSHA products

Rain flag is meaningfull

The altimeter rain flag algorithm has been updated

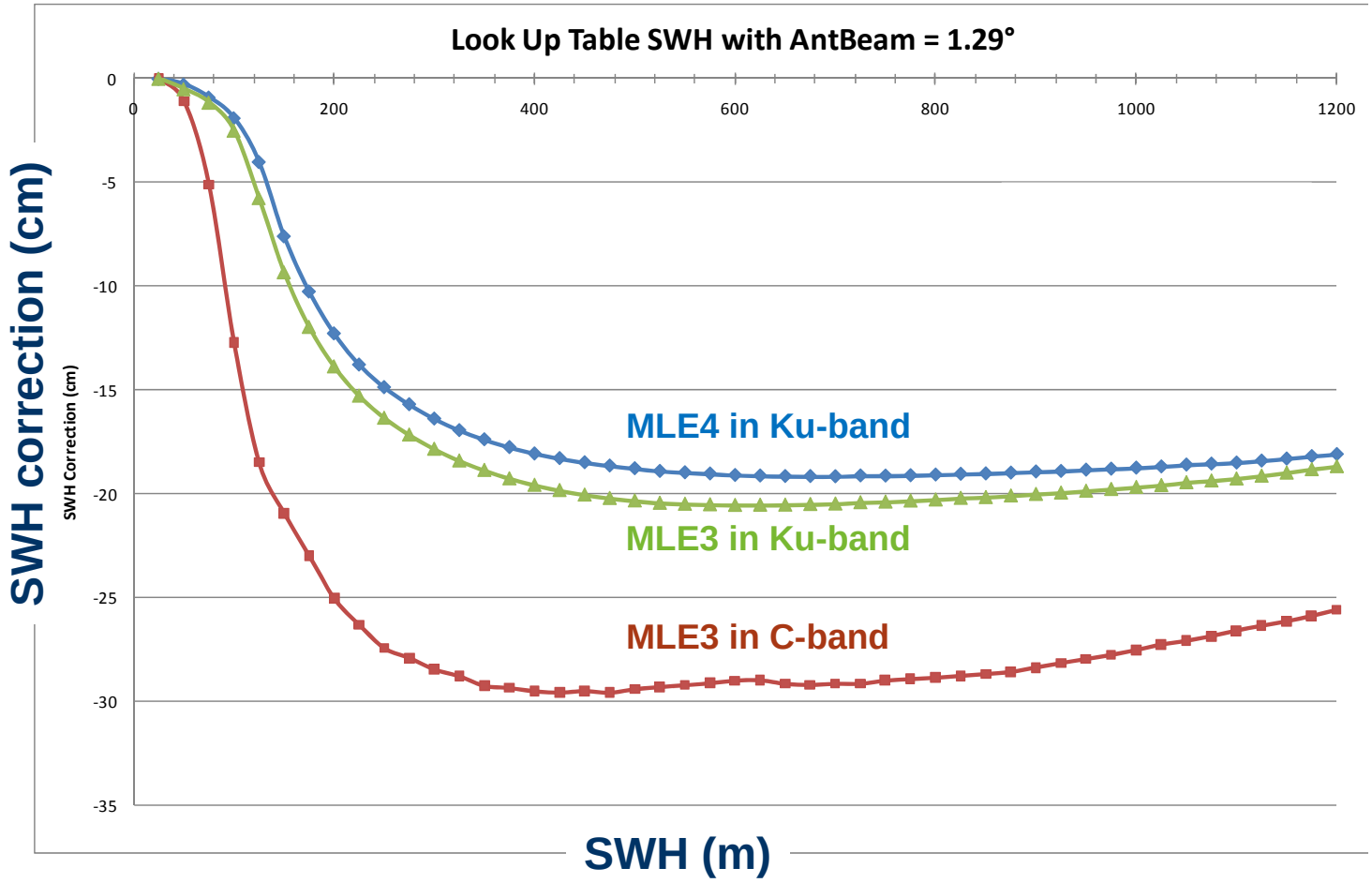
New parameters in SGDR products

The following parameters have been added in the SGDR products for expertise purposes (same corrections than those applied on MLE4 output) :

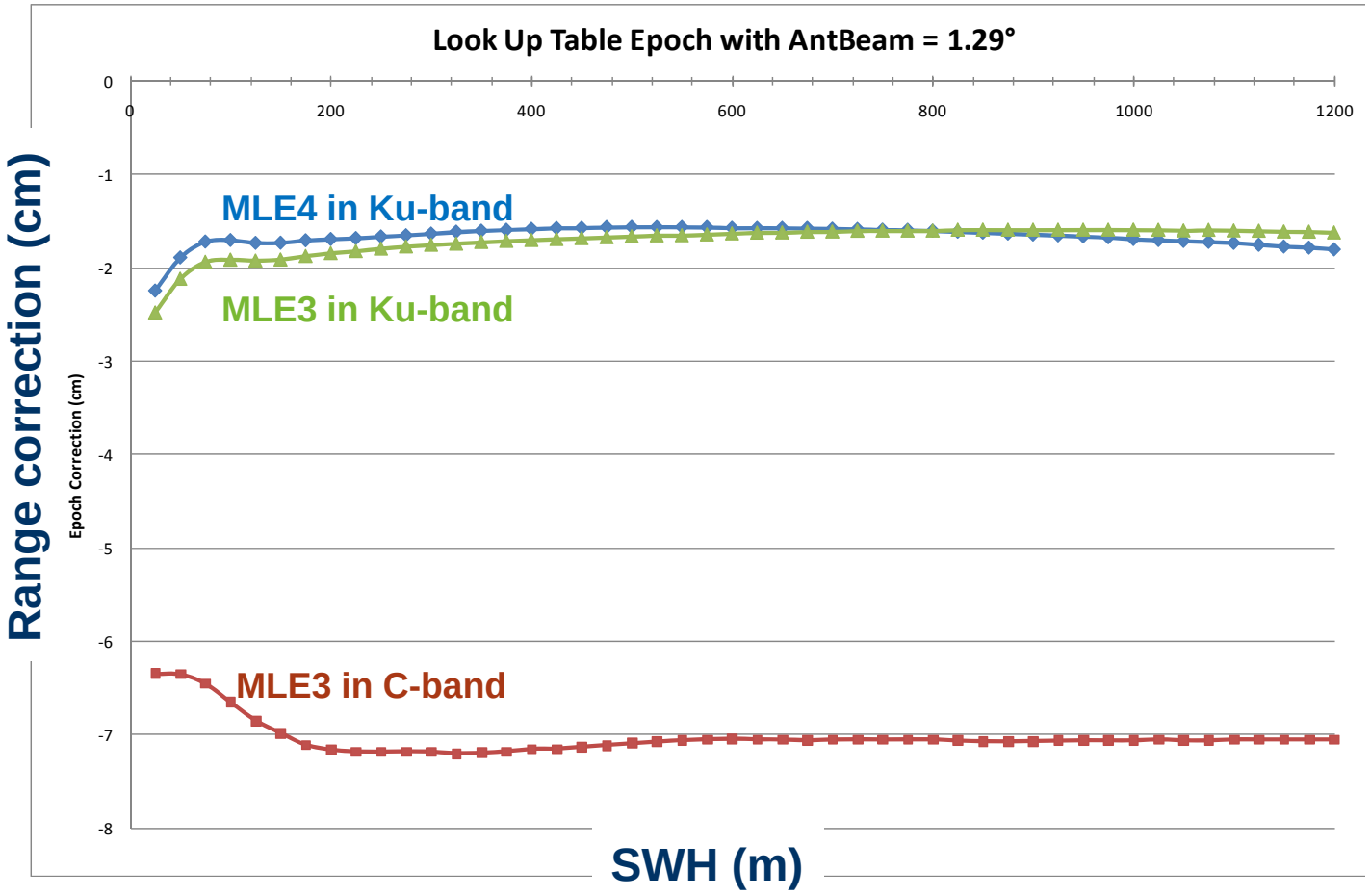
- Range, SWH and backscatter coefficient (at 20Hz) for the two bands
- Range, SWH and backscatter coefficient (at 1Hz) for the two bands + std deviation + map of valid points and validity flag
- MLE3 Instrumental corrections tables (LUT) (1Hz) and sum of the instrumental correction (1-Hz) for the two bands
- Output of the MLE3 retracking (at 20 Hz) for the two bands (epoch, amplitude, SigmaC, number of iteration, MQE)

MLE3 and MLE4 Look Up Tables

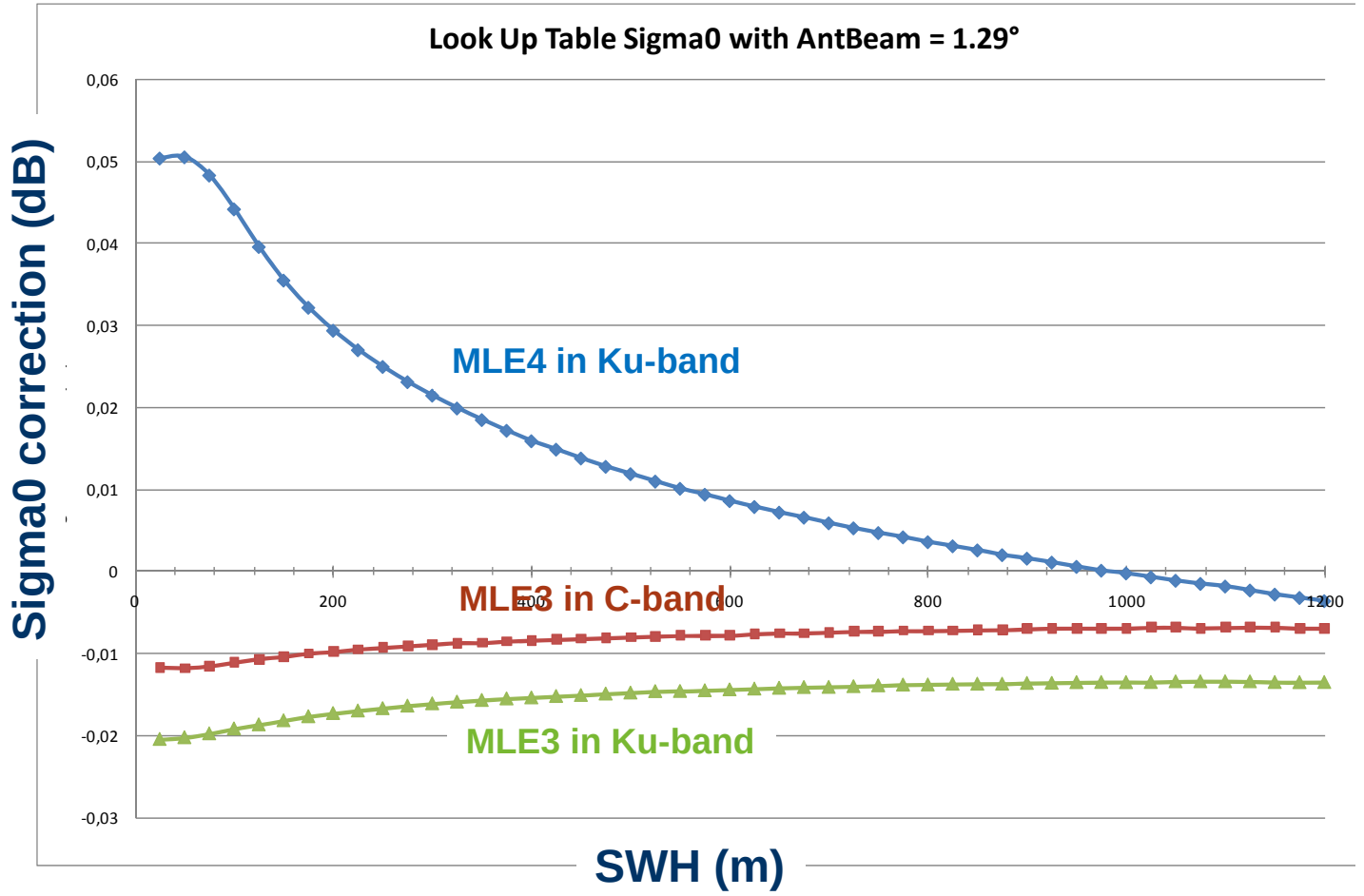
LUT have been recomputed to account for updates of the altimeter characterisation values (especially ku-band antenna aperture)



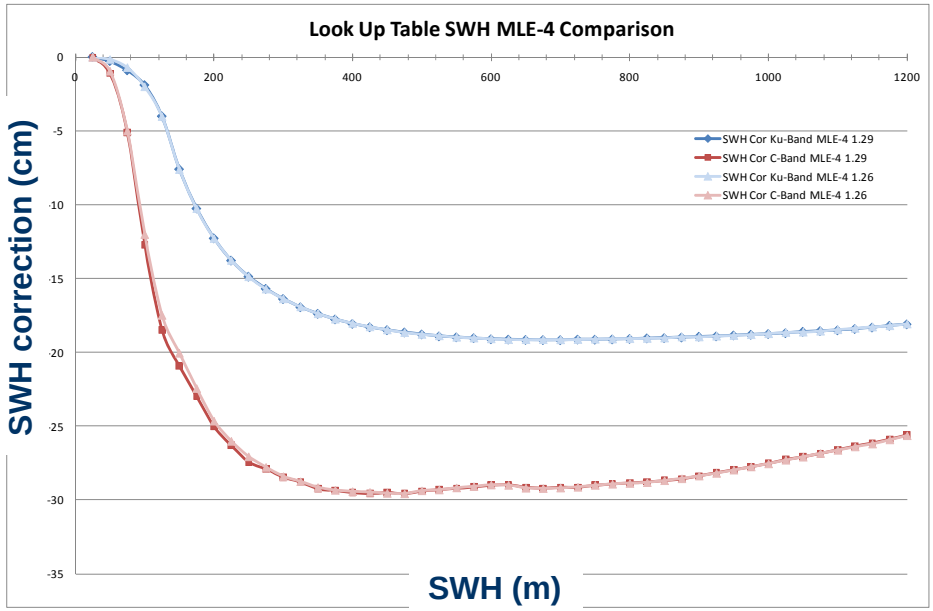
MLE3 and MLE4 Look Up Tables



MLE3 and MLE4 Look Up Tables

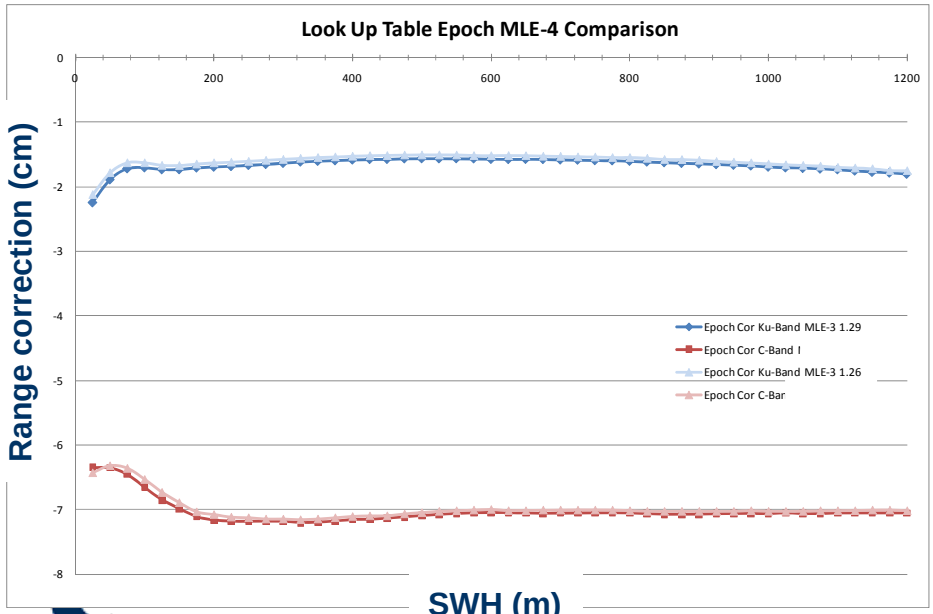


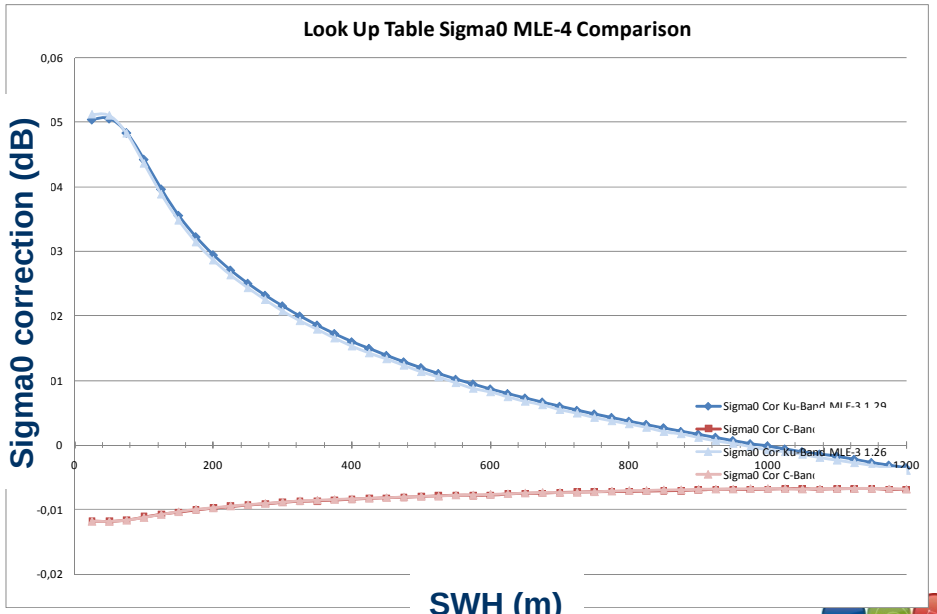
Evolutions between LUTs MLE4 with θ_0=1.26 and θ_0=1.29 deg



➔ Very small impact on products

➔ Nevertheless, new LUTs will be used for GDR-C





Update of the altimeter characterisation file and impacts

Update of the PRF (correct value = 2058.513239 Hz instead of 2058.5132)

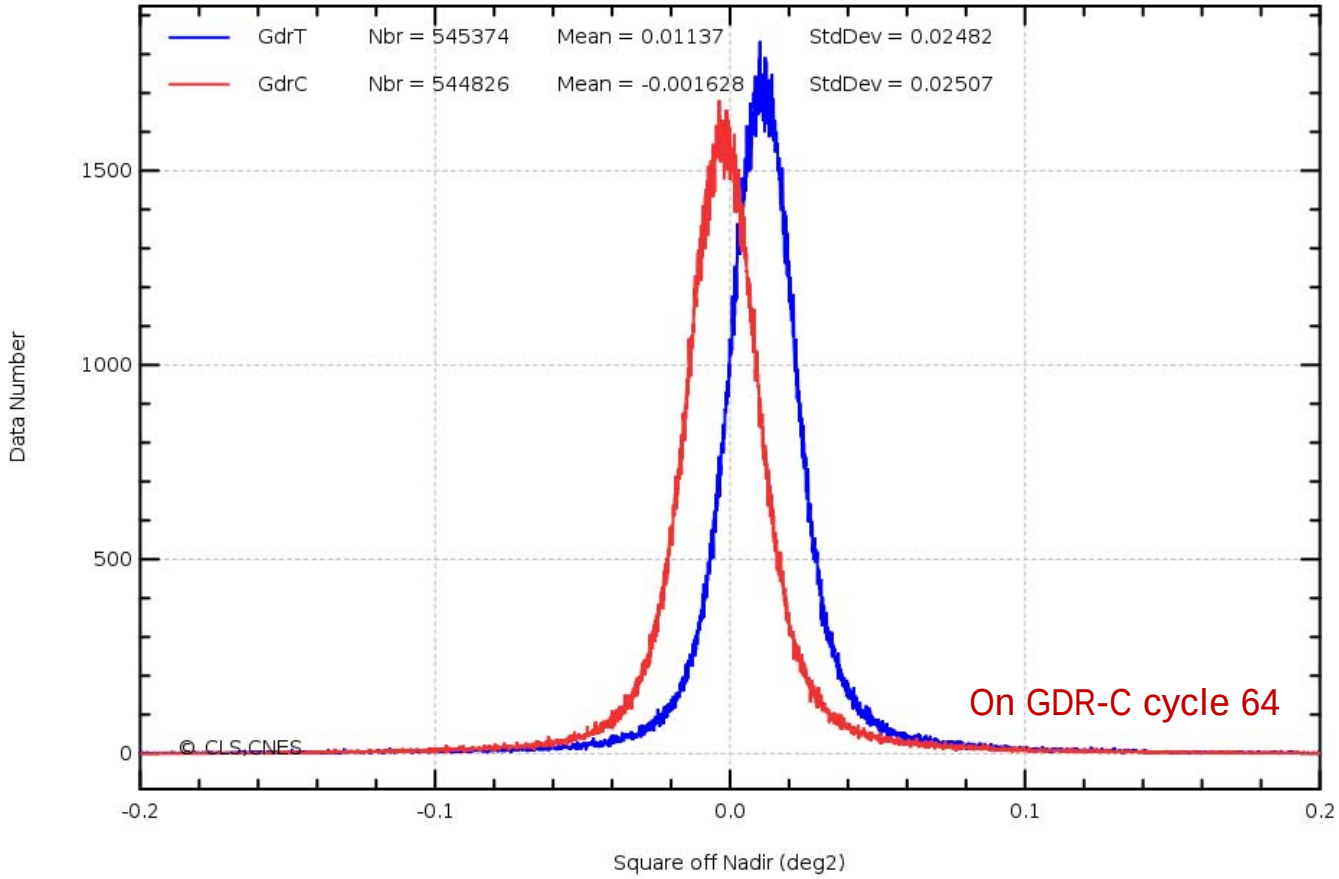
➔ *Theoretically the impact on range is :*
*(AmbOrder*c)/(2*2058.513239) - (AmbOrder*c)/(2*2058.5132) = -2.48 cm*

➔ *Observation on reprocessed cycles (64, 65 and 66)*

	GdrT	GdrC	delta GdrC - GdrT
cycle 064	19.69 cm	22.34 cm	~ 2.7 cm
cycle 065	19.86 cm	22.61 cm	~ 2.8 cm
cycle 066	19.97 cm	22.84 cm	~ 2.9 cm

Update of the altimeter characterisation file and impacts

Modification of the Ku-band antenna aperture (-3dB) (new value 1.29 deg instead of 1.26)
C band antenna aperture unchanged (3.38 deg)



Update of the altimeter characterisation file and impacts

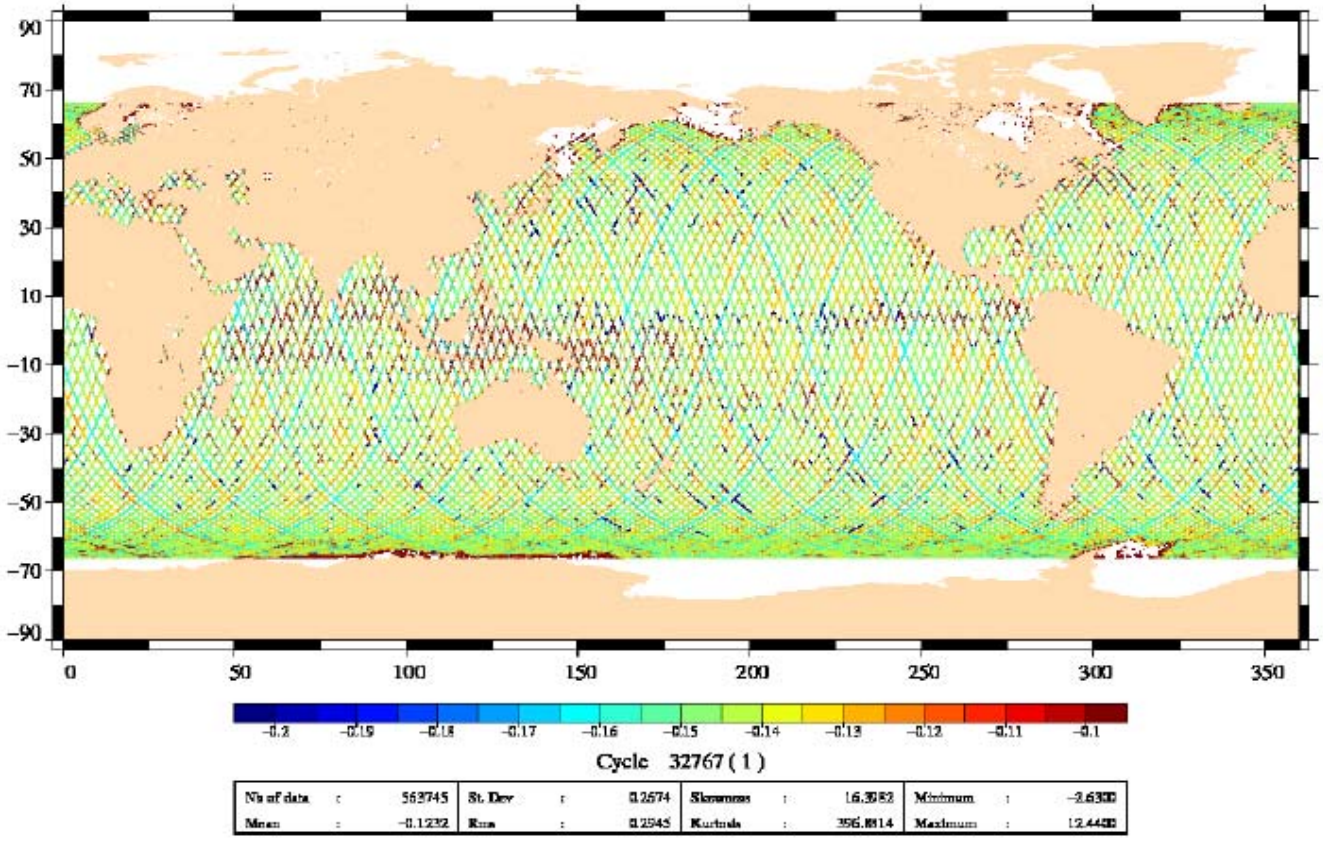
Modification of the MQE threshold for 20Hz to 1Hz compression

0.0171 in Ku band

0.1559 in C band

➔ Allow a better editing of the data, especially on areas where the Wfs are impacted by blooms and rain

Map of sig0_ku differences between GdrC and GdrT.



Rain flag from MLE3 estimations and Wind speed and SSB : comparison MLE3/MLE4

One year of Jason-2 data has been reprocessed (cycles 1 to 43) with :

- update of the antenna aperture in Ku band
- update of the MQE threshold
- no injection of Ku band mispointing angle in C band retracking

•Without PRF correction (= to a bias)

See Ngan Tran presentation

Differences between Pos2 and Pos3 range measurement

- **2 main origins**
  - Truncate PRF is used in ground segment
  - Difference in the internal path delay values (derived from ground measurements)

Parameter	JASON1	JASON2	JAS-1/JAS-2 Difference
PRF truncate effect	-0.316 cm	-2.471 cm	-2.156 cm
Internal path delay for Ku band	4.151466 m	4.268487142 m	11.70211423 cm
			9.5 cm

  - Total difference for Ku band : 9.5 cm (CalVal difference for Ku Band : 8.3 cm)
  - Remaining Difference in Ku Band ~ 1.2 cm
- **Conclusion :**
  - Poseidon2 and Poseidon3 are very close in term of hardware, the difference of range between JASON1 and JASON2 is artificial and explained ---->

Remaining difference in Ku band : ~ 1cm

  - Investigations are still in progress to explain the difference between Jason1/2 and Topex

- **Based on the reprocessed cycles :**
  - Cycle 64 mean SSHA bias = 22.34 cm mean
  - Cycle 65 mean SSHA bias = 22.61 cm mean
  - Cycle 66 mean SSHA bias = 22.84 cm mean

Overall mean on those 3 cycles = 22.6 cm mean

Conclusions

All evolutions have been implemented and validated on 3 test cycles.
This has demonstrated that modifications were implemented as required, and allowed the validation of GDR_C standards.

However, some questions are left opened (before GDR_C processing start ??) :

1. **The wind is slightly overestimated. See M. Ablain and S. Phillips presentations**
2. **The SSB should be computed with a wind derived from MLE3 estimates. See N. Tran presentation**
3. **The ionospheric correction is underestimated. See S. Phillips presentation**
4. **We could (should ??) apply a datation bias equal to the one applied on Jason-1. See S. Phillips presentation**