Jason-2 instrumental and processing status

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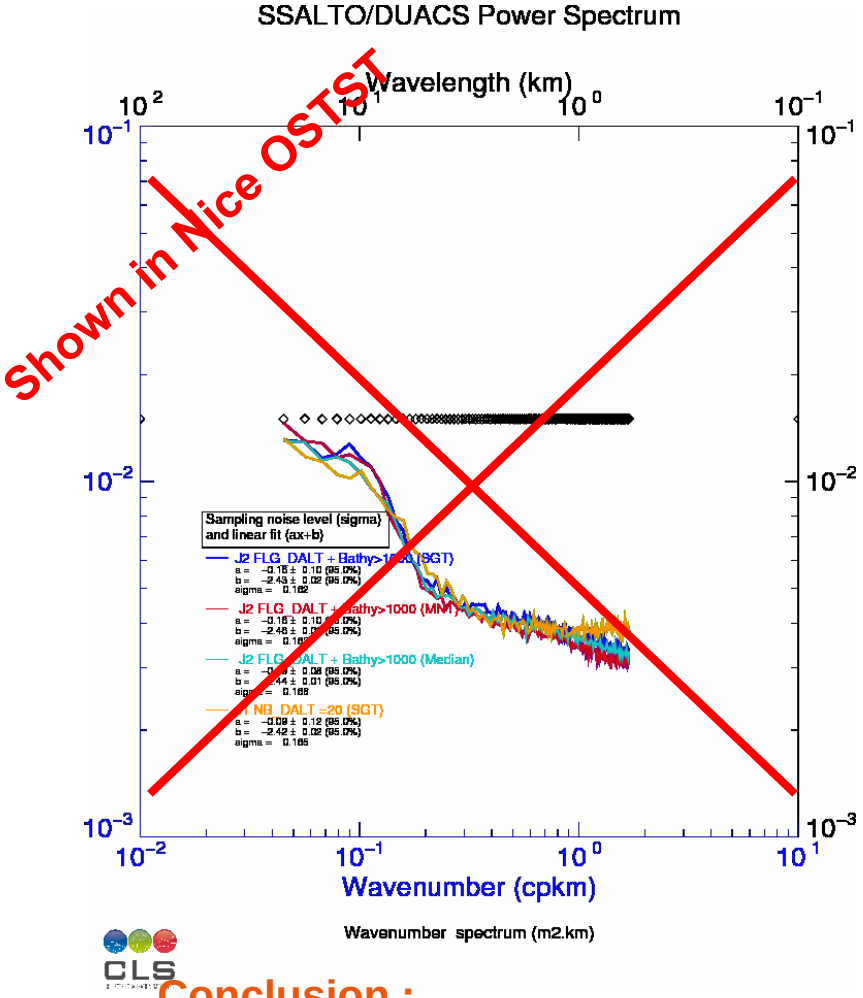
Introduction

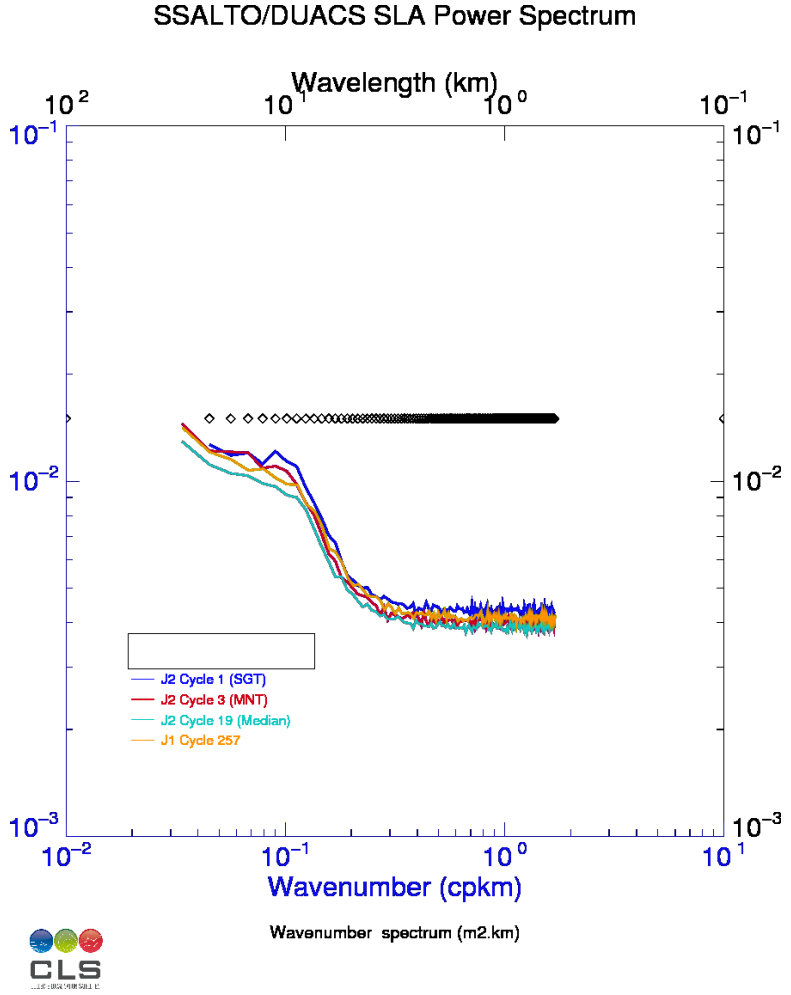
In Nice OSTST, very good results about Jason-2 performances were presented by various speakers. Since then, we have got confirmation of these very good results.

However, some studies were decided to investigate (and close) some specific points :

- J2 colored spectra and impact of Wfs compression
- Mispointing and antenna beamwidth
- Retracking diagram for C band
- Skewness coefficient
- Rain flag
- Impact of filter variability on altimetric parameters

Jason-1/Jason-2 Spectra





Conclusion :

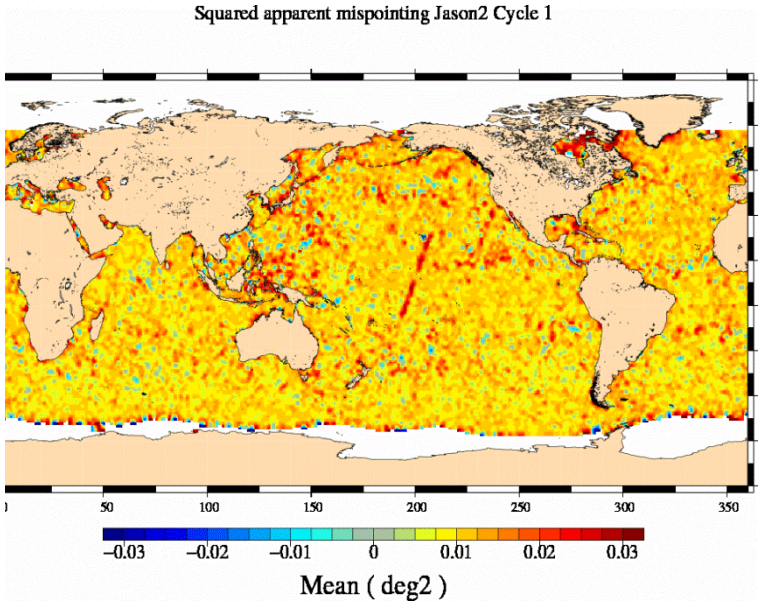
➔No impact of WF compression on noise coloration

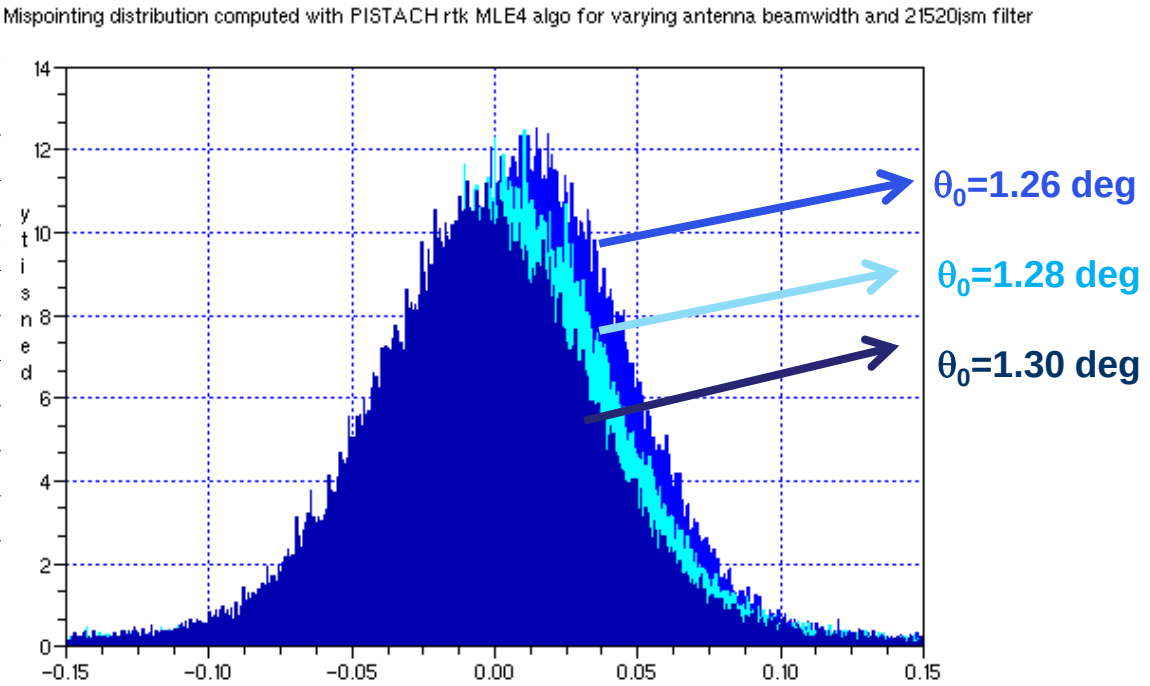
➔ Noise coloration was due to an editing problem in our processing chains

Mispointing angle

The Jason-2 pointing angle is slightly biased ➔+0.1 deg

The antenna beamwidth value (which was determined on ground) can be ajusted to reduce this bias (verifications have been done with platform pointing values during cross-manoeuvres)





Median values : -0.068 deg for θ_0=1.30°
+0.068 deg for θ_0=1.28°
+0.115 deg pour θ_0=1.26°

➔ **Conclusion : θ_0=1.28° recommended**

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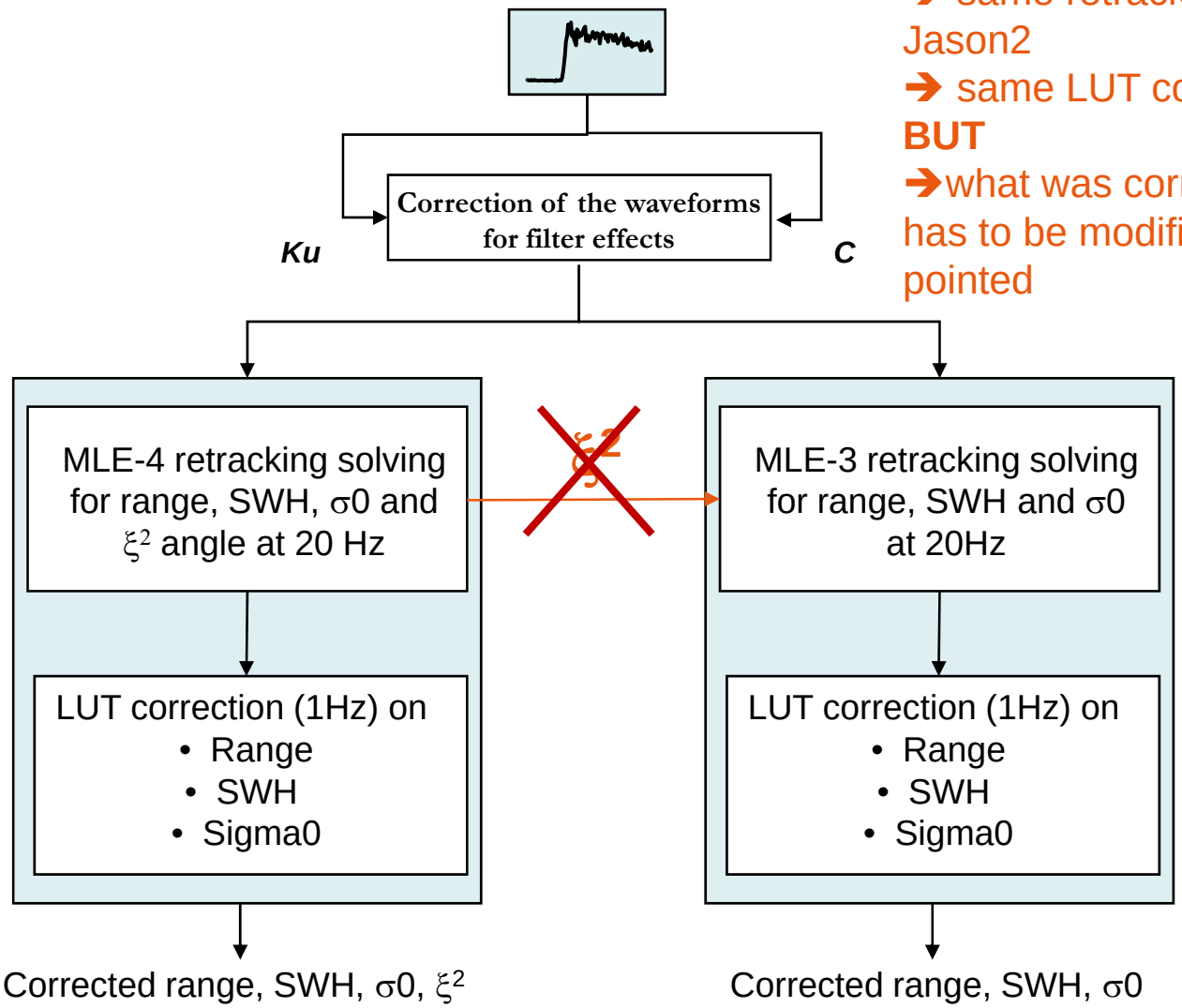
J1/J2 Waveforms Retracking diagram



➔ same retracking diagram for Jason1 and Jason2

➔ same LUT correction principle

BUT

➔what was correct (and necessary) for J1, has to be modified for J2 because J2 is well pointed

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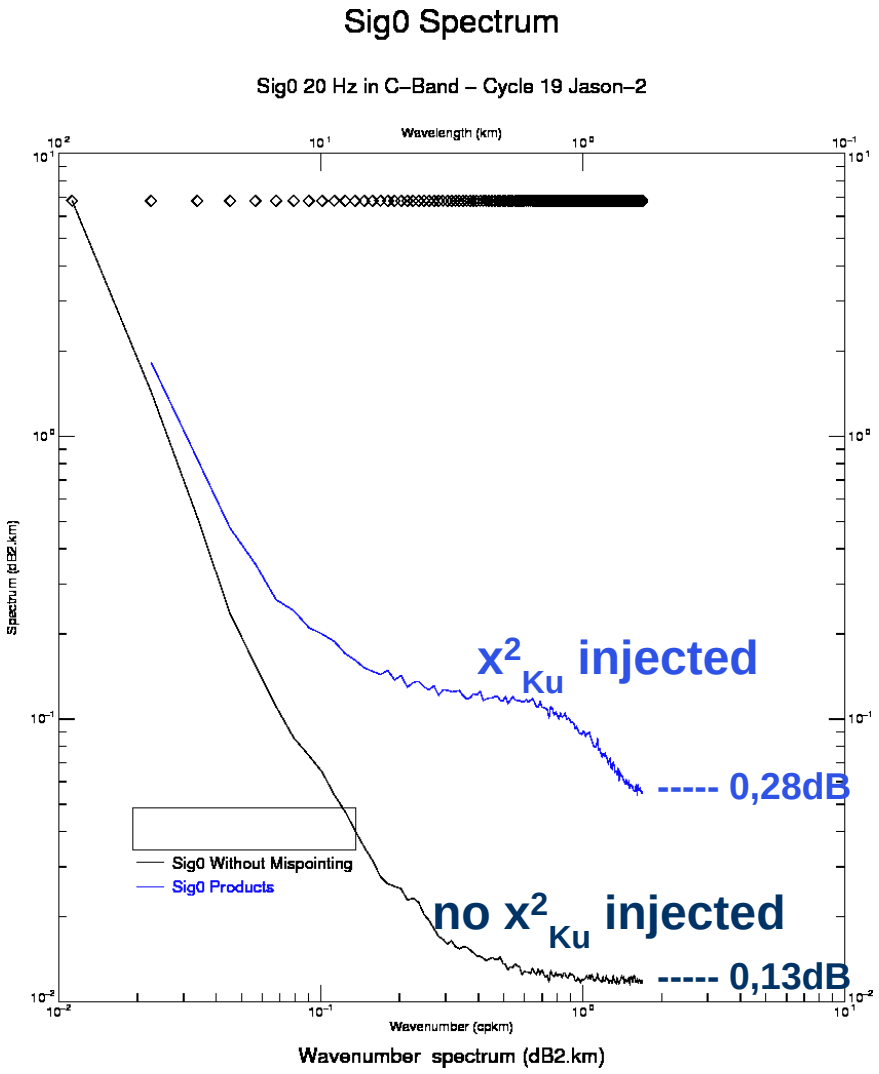
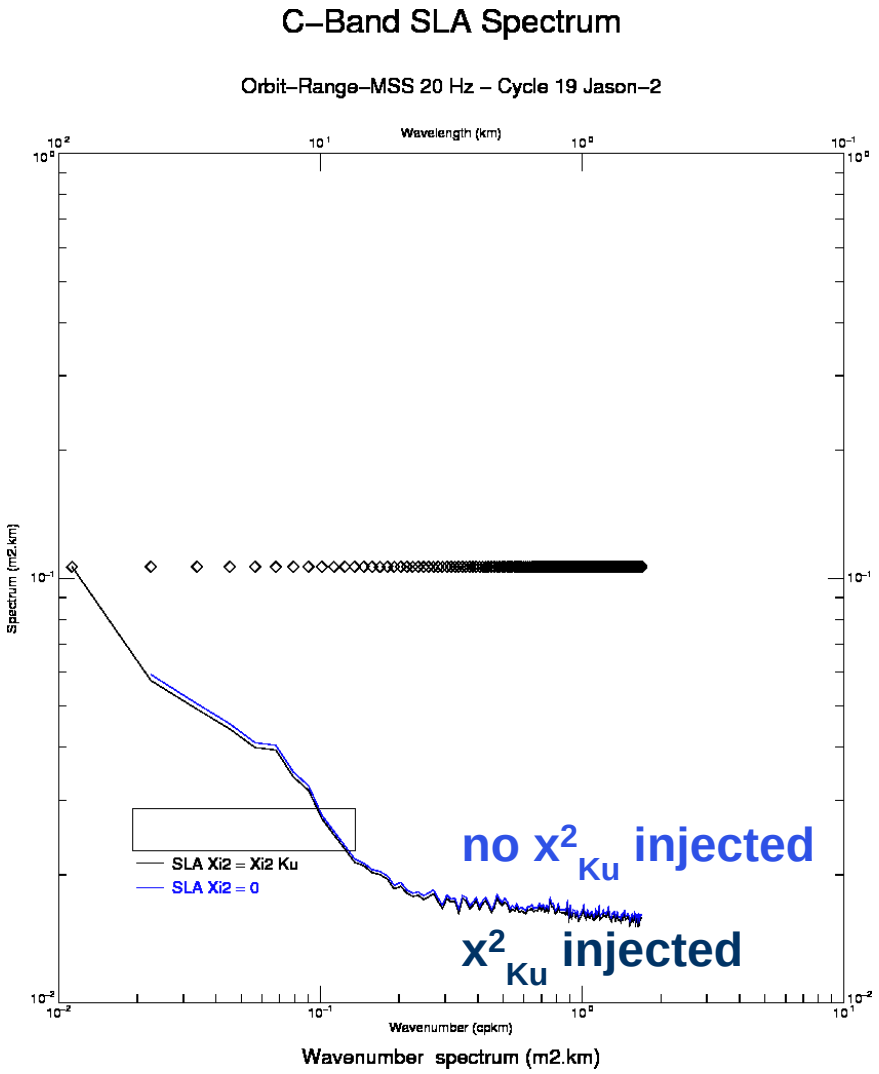
Jason-2 waveform retracking in C band





➔ **Conclusion : no ξ^2_{Ku} injection recommended**

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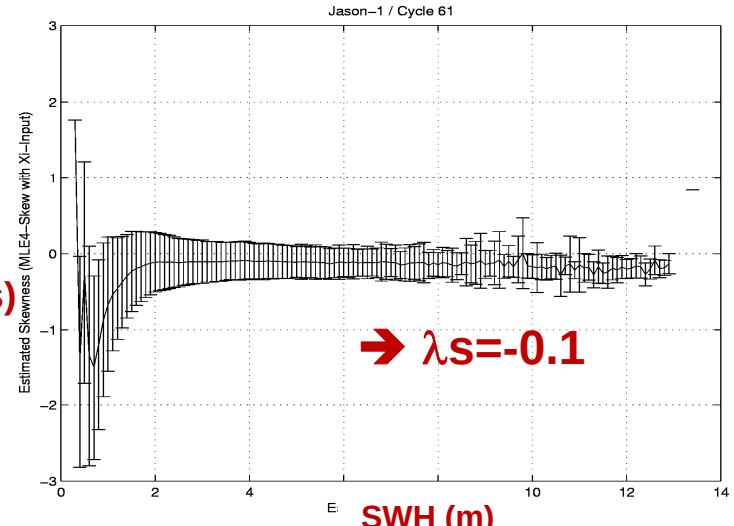
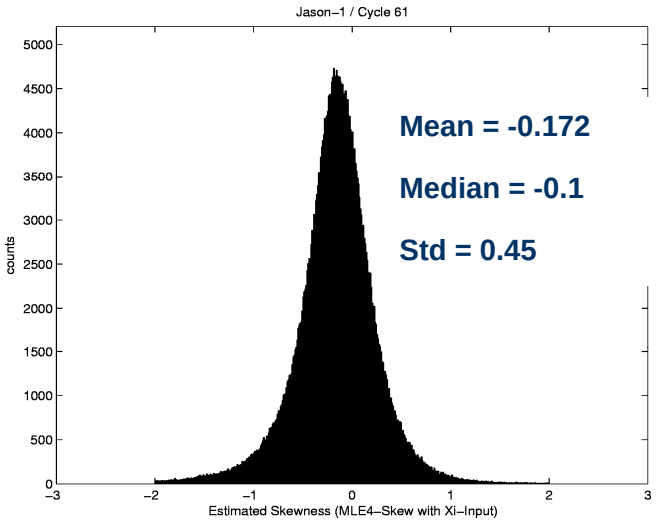
Determination of the skewness coefficient

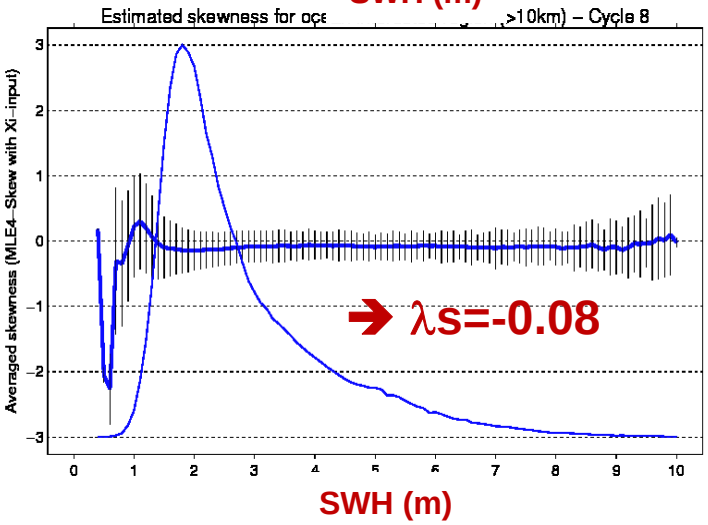
Jason-1 Skewness (SGT Tracker, MLE4 on 1Hz avg WFs)



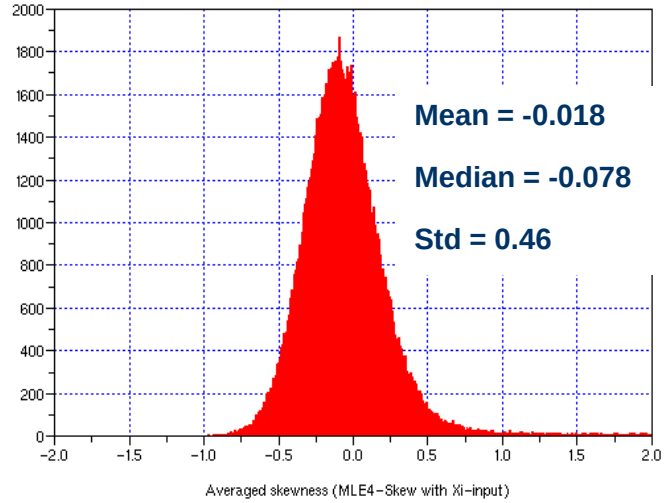
➔ λs=-0.1



Jason-2 Skewness (Median Tracker, MLE4 x2 + MLE4 ls on 20Hz WFs)



➔ λs=-0.08



➔ <u>Conclusion</u> : the same skewness value can be used for Jason-1 and Jason-2

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Jason-2 rain flag

- On Jason-1, the rain flag is unsatisfactory because it has been done from instrumental Ku/C AGC relationship and not from geophysical signals (σ0 Ku and C)

- Moreover, Jason-2 AGCs vary from Jason-1 AGCs ➔ rain flag no more valid

- The Ku/C sigma0 relationship cannot be used as for J1 GDR A (MLE3)

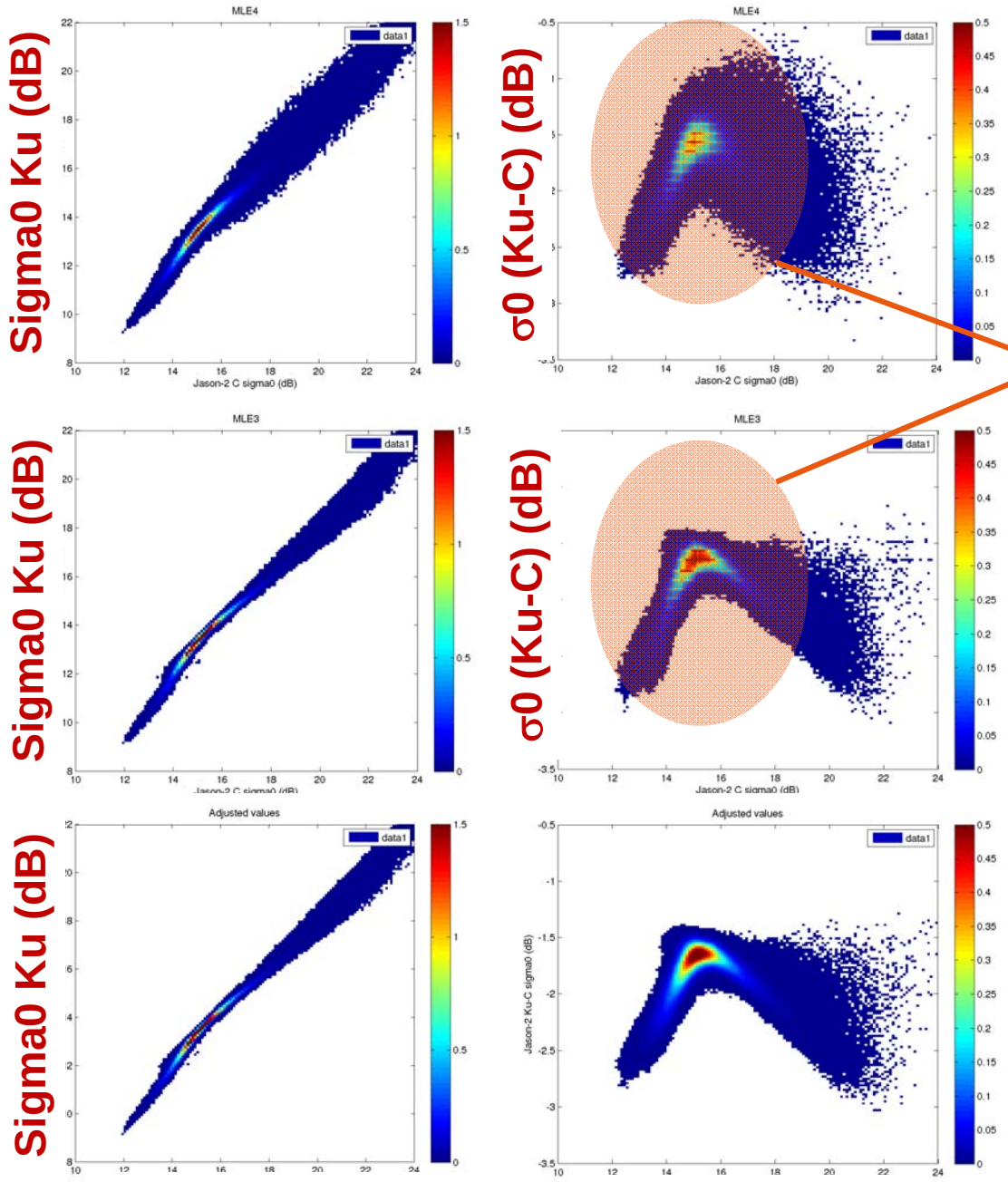
- Graham Quartly tried to fit a new flag with empirical corrections (poster presented during the last OSTST)

- We performed :

  ✓ a MLE3 on Ku band WFs to estimate sigma0 (not possible on Jason-1 because of deteriorated platform pointing)

  ✓ a MLE3 on C band WFs without injection of Ku mispointing angle (evolution wrt Jason-2 ground segment)

Jason-2 Sigma0 (N.tran)



MLE4 (products)

Lower dispersion for MLE3 than for MLE4

MLE3

G.Quartly

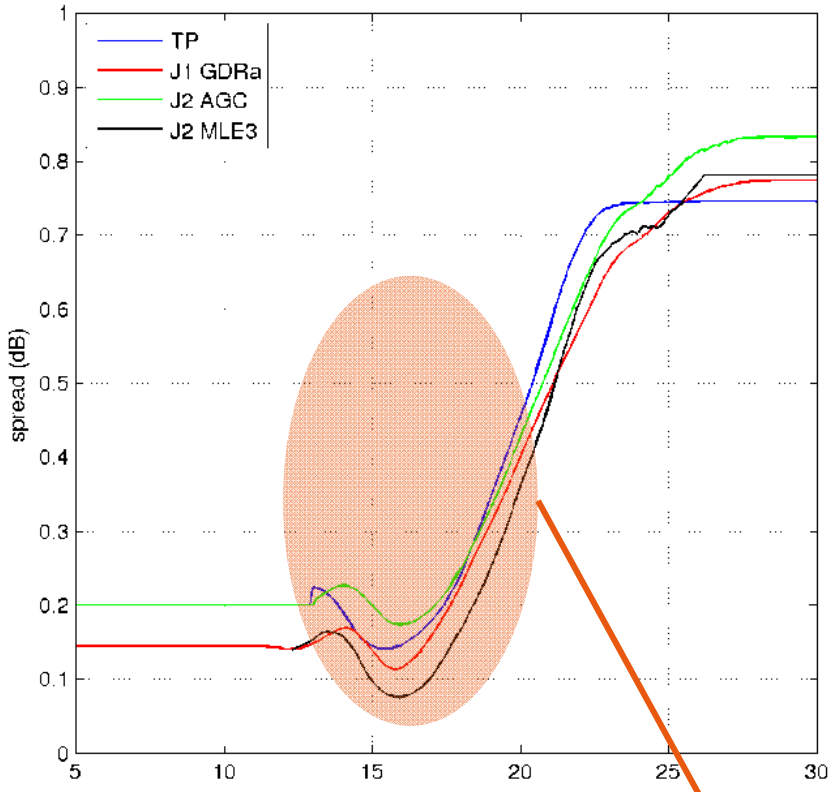
Sigma0 C (dB) **Sigma0 C (dB)**

Jason-2 Sigma0 (N.tran, J.Tournadre)

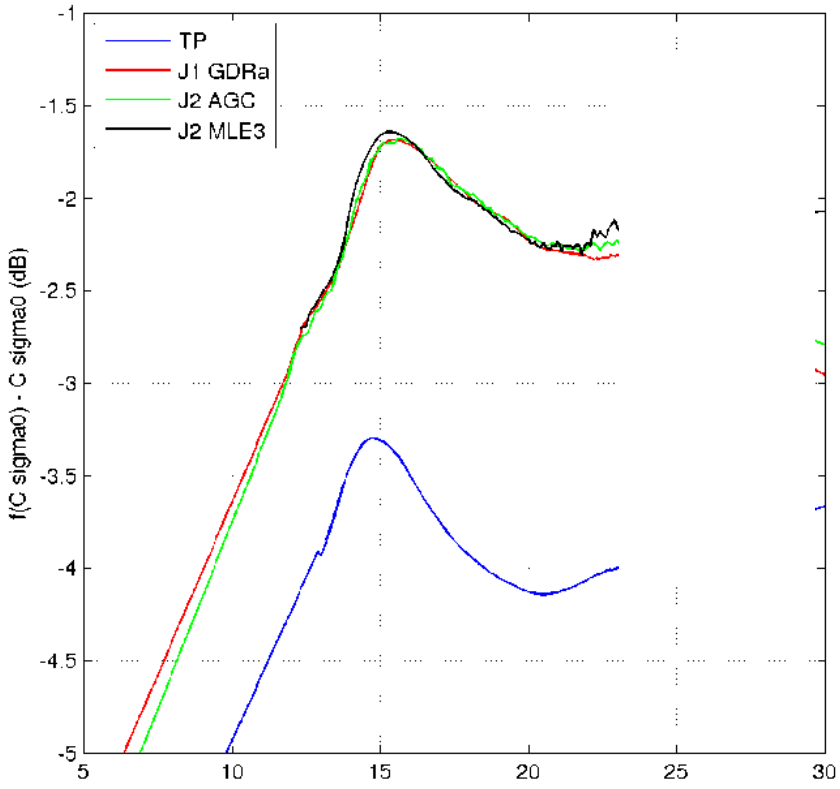
➔ Comparison (for different missions) of the σ0 (Ku-C) differences

➔ Comparison (for different missions) of the σ0 (Ku-C) rms relationship

J2 / J1 GDRa / TP



J2 / J1 GDRa / TP



J2 MLE3 very homogeneous with J1 MLE3

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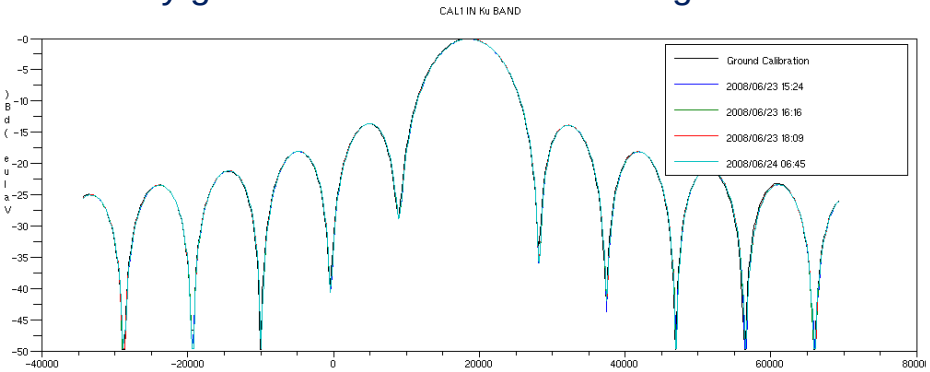
Conclusions :

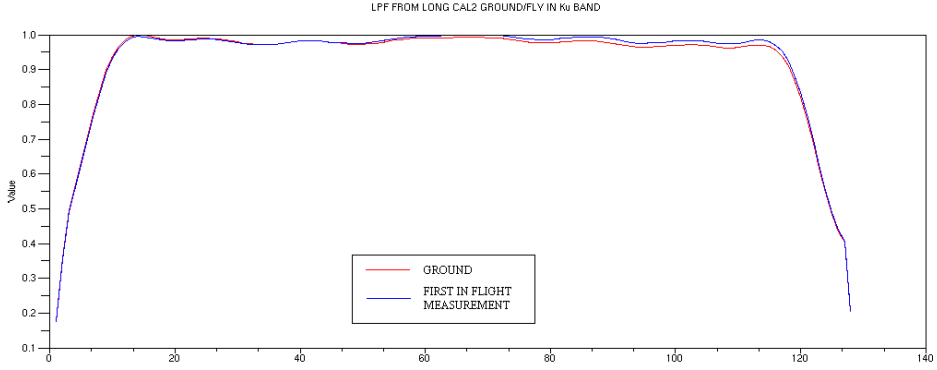
We recommend :

- to perform an MLE3 on Ku band and a MLE3 on C band (without any injection)
- to compute the corrected values of Ku and C $\sigma 0$ (one year of data needed)
- to compute a new rain flag based on the Ku/C sigma0 MLE3 relationship
- to update new coefficients for the wind speed algorithm (we recall that on Jason-2, it was fitted on Jason-1 MLE3 values ➔ Collard algorithm)
- to update a SSB solution accounting for the updated wind speed

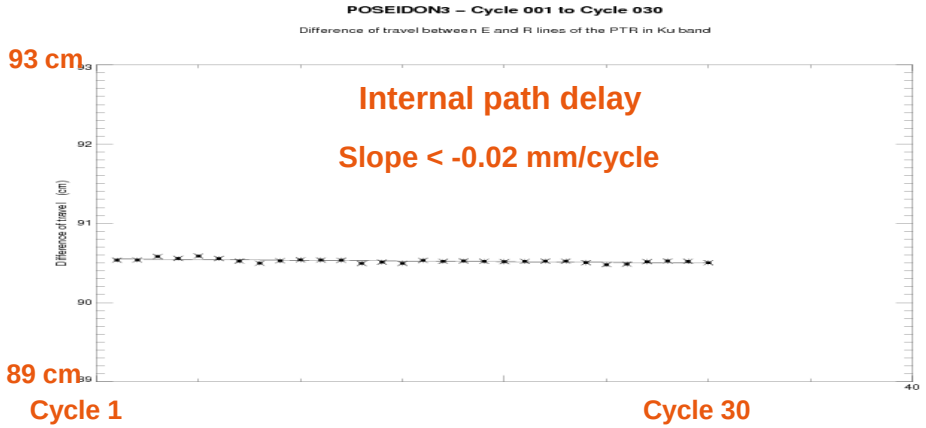
Instrumental monitoring

➔ Very good coherence between on-ground and in-orbit Poseidon-3 PTR and Filters



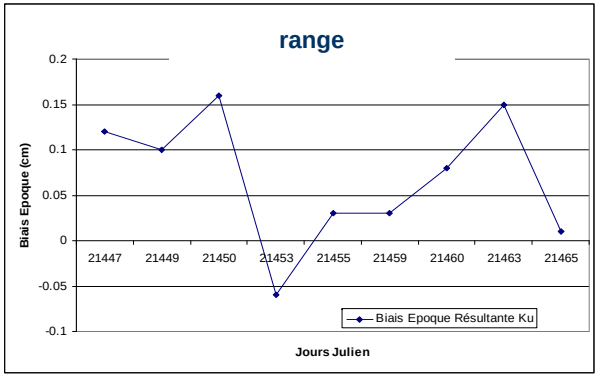


➔ Very good stability of Poseidon-3 PTR and Filters

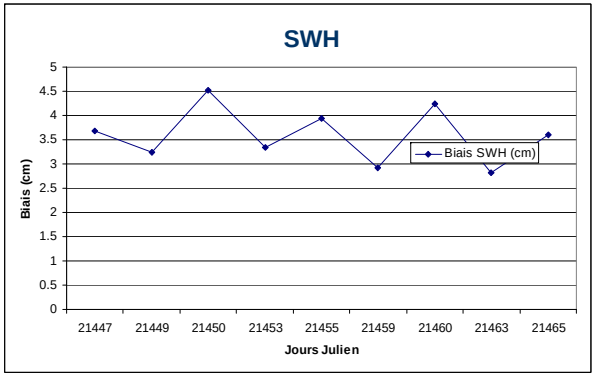


Conclusion : negligible impact on LUT

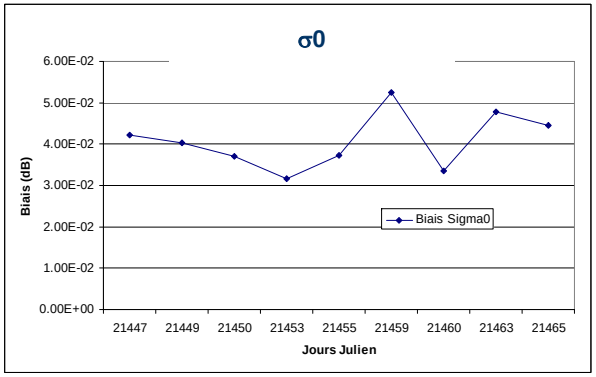
Impact of the J2 filters variability (1 LTM filter per day – 10 days)



➔Range variability = 2 mm



➔SWH variability = 1.5 cm



➔Sig0 variability < 3 E-2 dB

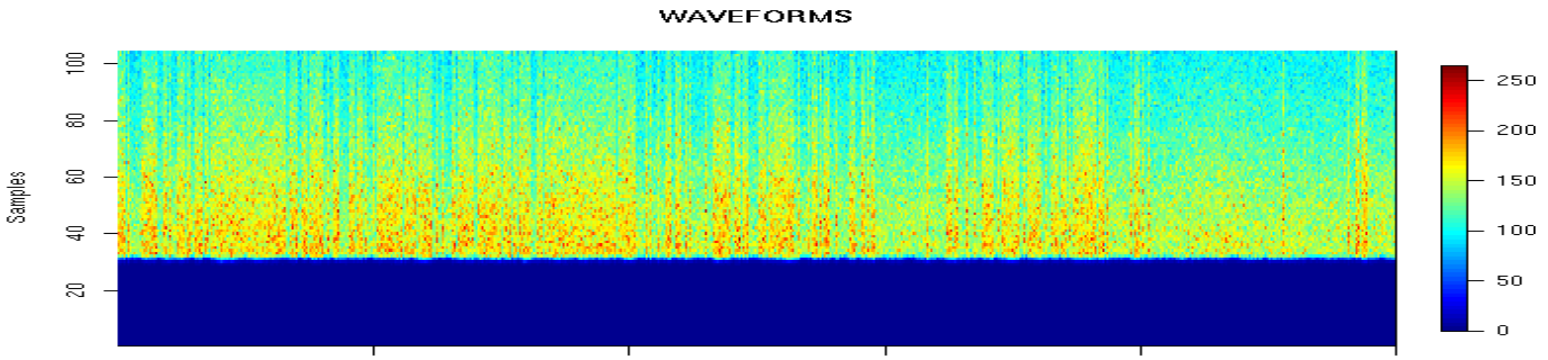
Conclusion : correction by a stable filter would improve the precision Of the estimations

Update of the Flight Software : position of the WFs in the analysis window ➔ OK

Jason-2

Median tracker

Cycle 008

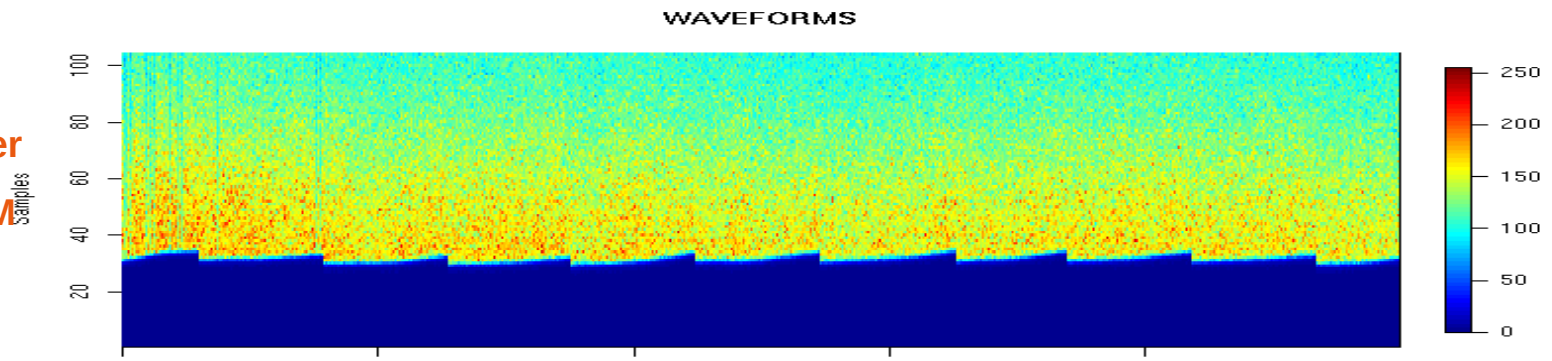


Jason-2

Diode/DEM tracker

Before Update FM

Cycle 007

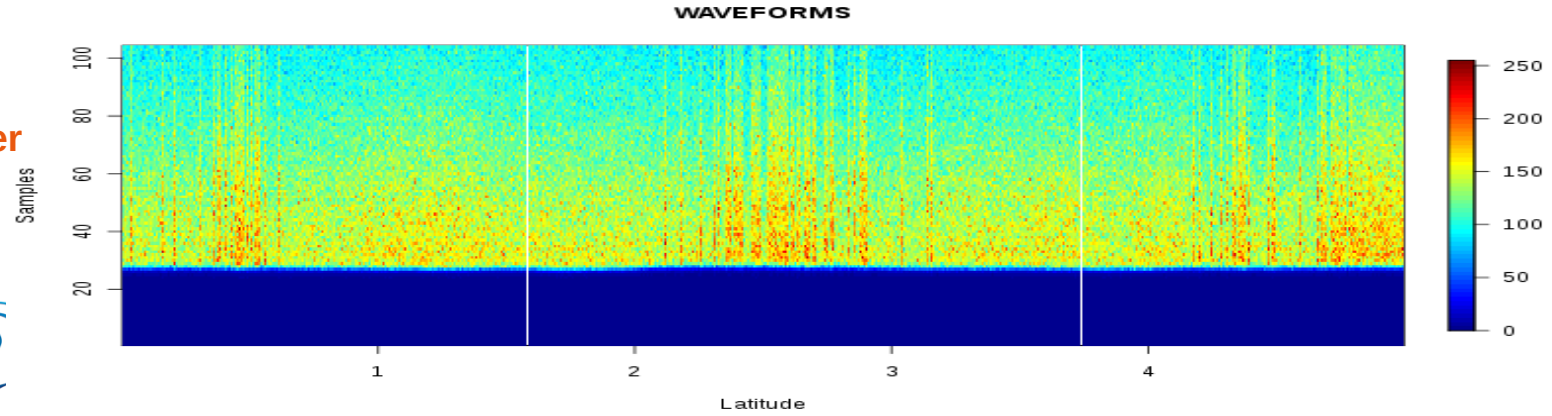


Jason-2

Diode/DEM tracker

New FM

Cycle 034



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Conclusions

- Jason-2 in very good agreement with Jason-1
- Very good instrumental stability of Poseidon-3

- Some improvements recommended
  - Antenna beamwidth
  - C band processing
  - LUT and Skewness are OK
  - Rain Flag with MLE3 + Wind_Speed + SSB
  - Filter correction could be improved

Thank you !

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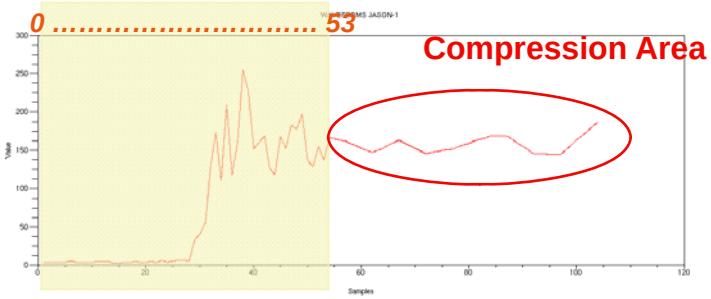
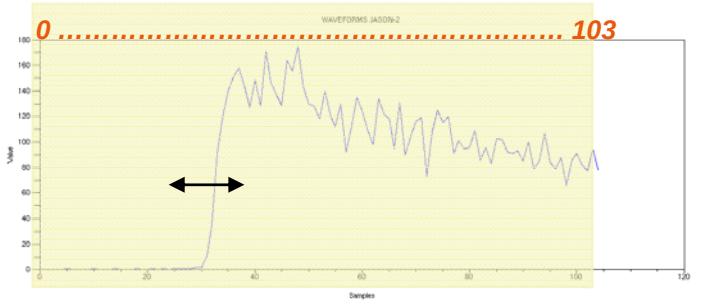
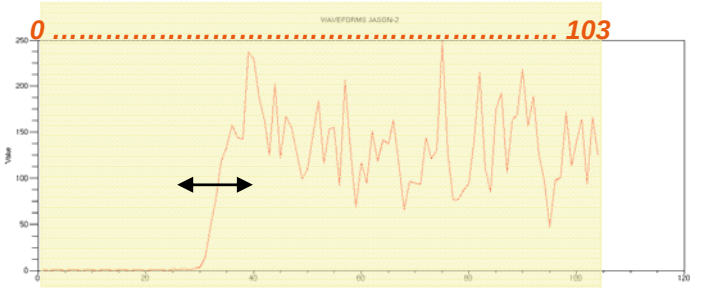
Differences between Jason-1 and Jason-2 waveforms

➔ Due to telemetry rate, Jason-1 waveforms are compressed

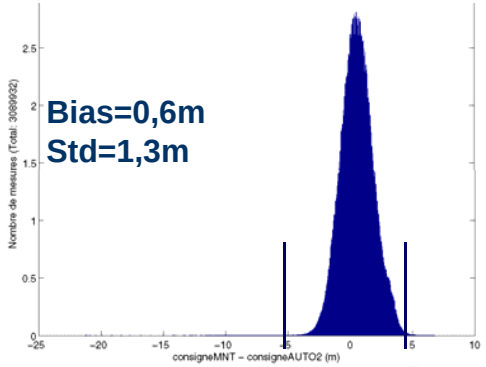
	Ku band waveforms	C band waveforms
Jason-1		
Jason-2		

➔ SGT tracker on Jason-1 = echos are centred on gate 44

➔ Median and DIODE/DEM on Jason-2 = Lateral motion of the echos in the window

- for median : depends on the waveheight (as for Envisat)
- for DIODE : depends on the local value of the DEM
- AGC tracking loop : small differences in C band loop coefs

Differences between median and DDEM trackers



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