# Improving Jason-2 $\sigma^0$ values

(& the implications for rain-flagging)


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**1) MLE-4 cross-talk**

**2) Improvements to**

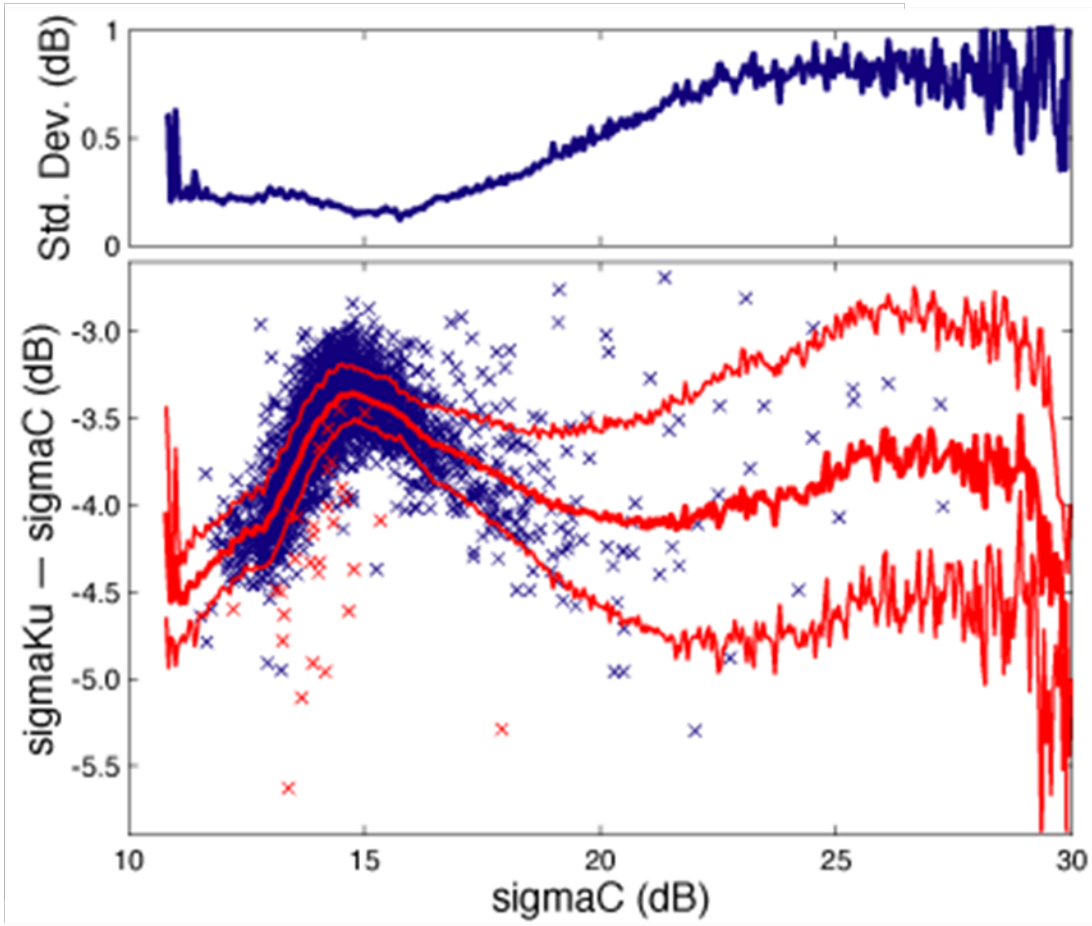
***i) Wind profiles***

***ii) J1-J2 comparisons***

***iii) Rain-flagging***

# Rain-flagging: A reprise

**Historical example using TOPEX data**




Red crosses indicate 'rain' according to LWP

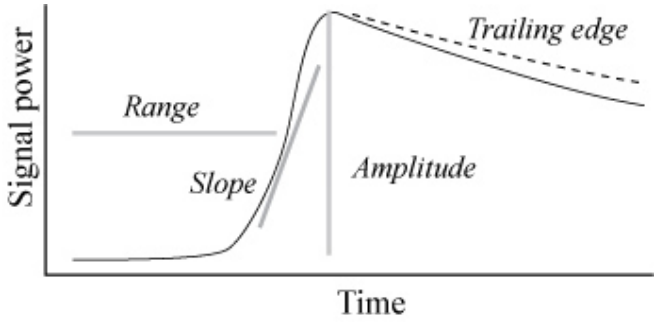
Well-defined relationship

(wind increases roughness at both scales to similar extent)

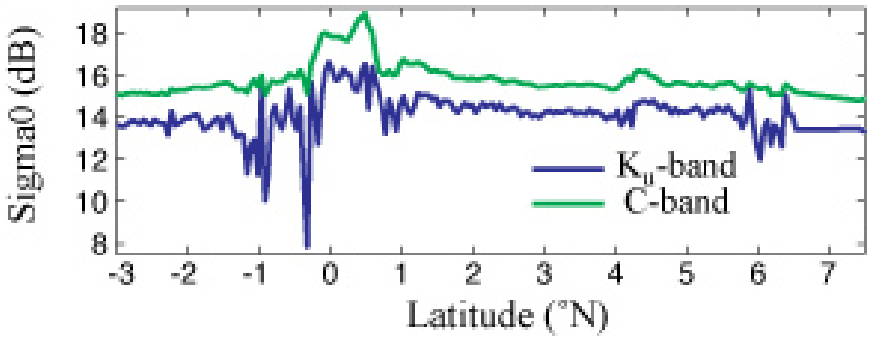
Small scatter

Points significantly below curve are associated with rain

# MLE-4 : Switch to AGC?

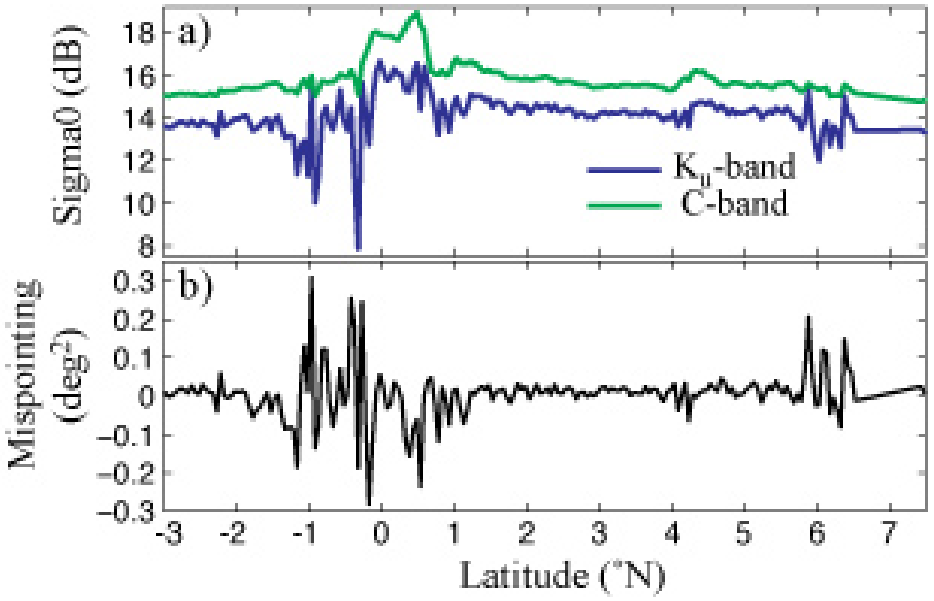



**For Jason-2 & reprocessed Jason-1, use of MLE-4 => greater along track changes in $\sigma^0$**




1) Not a physical measure
2) Predictive (depends on tracker)
3) We can do a lot better!

# Correlated effect

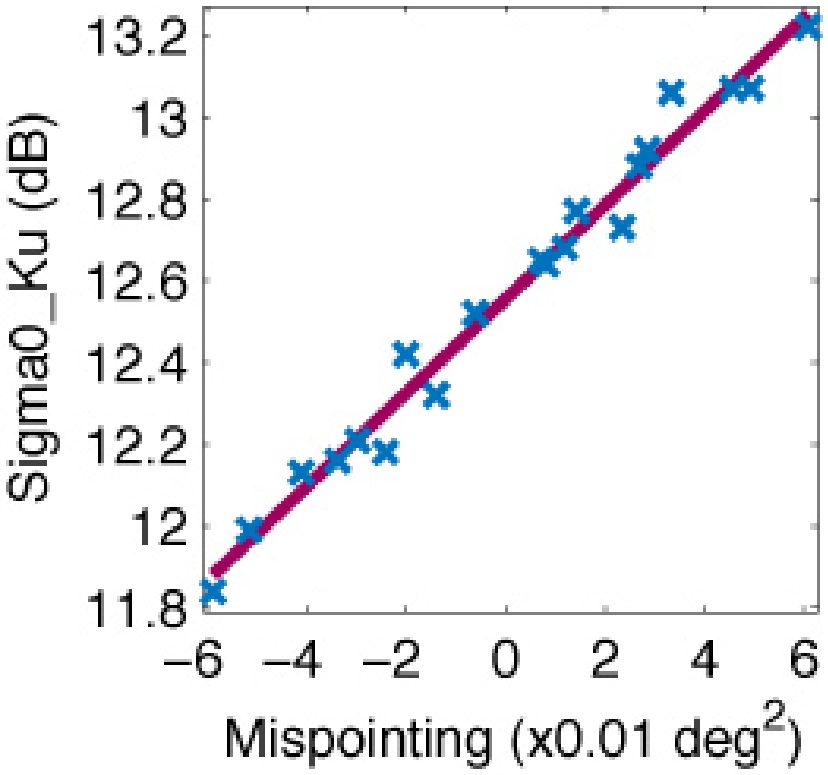


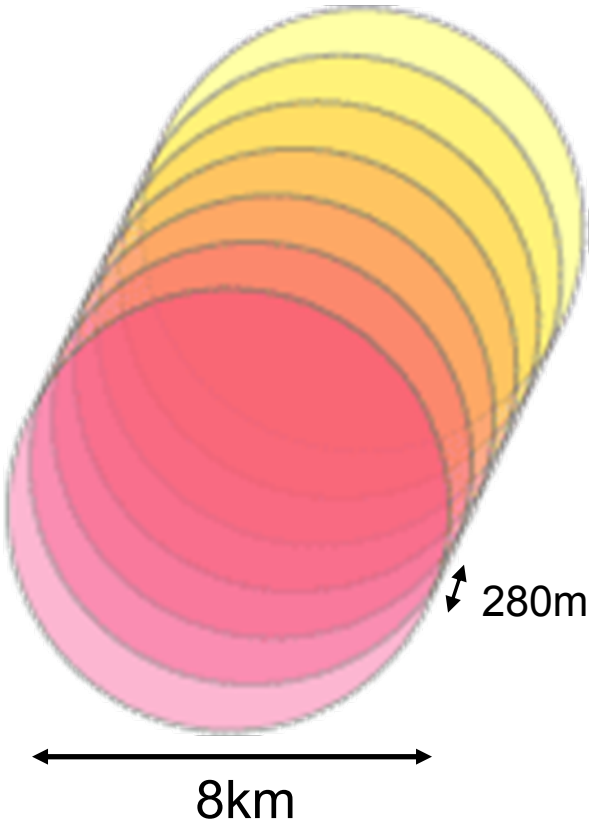

>> Analyse per cycle X

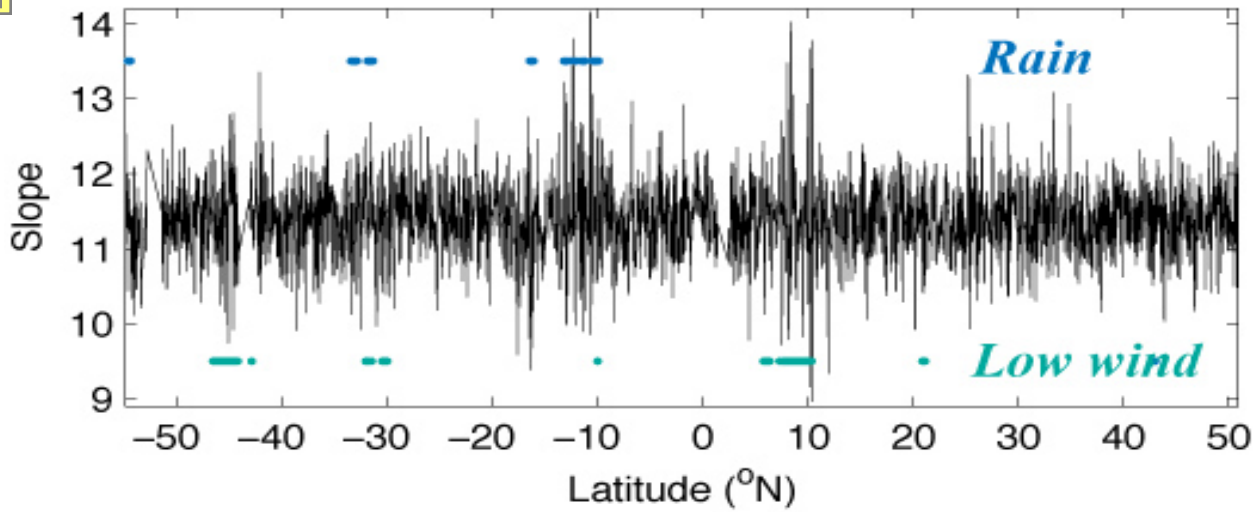
>> Analyse in short segments X

>> Analyse separately each second of data

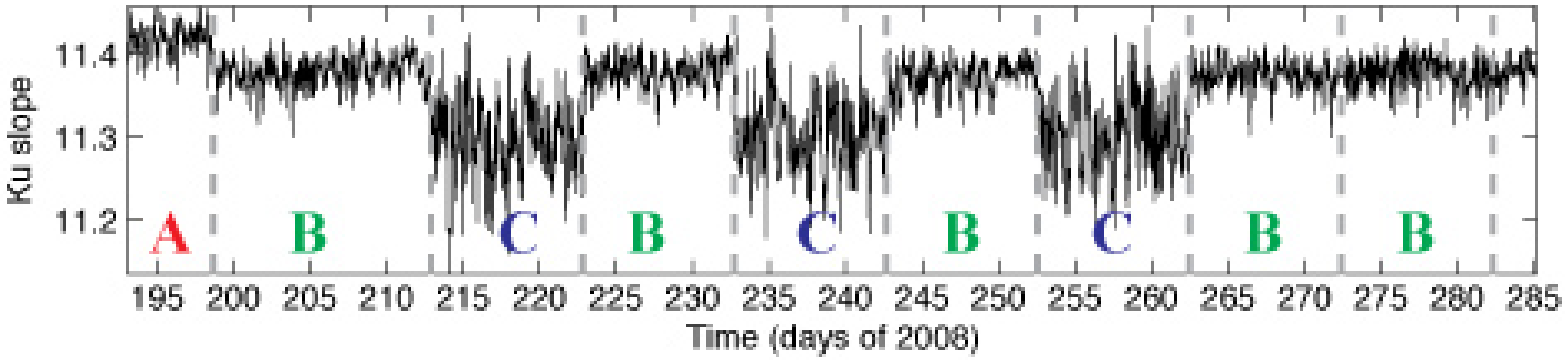
# Microscale correlation






Nearly constant value for pass of data encompassing a wide range of environmental conditions




**A - Split gate tracker**

**B - Diode median**

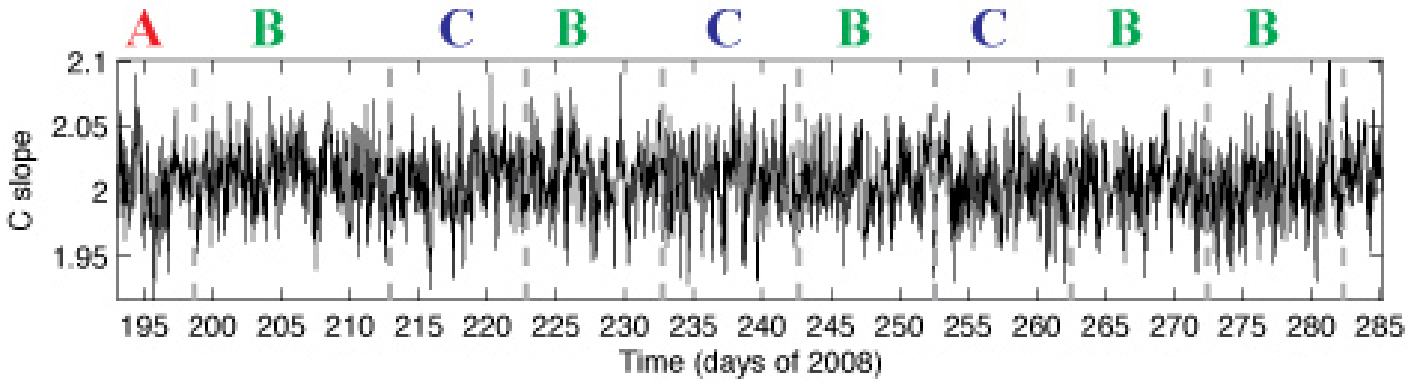
**C - Diode-DEM coupled mode**

# & C-band?

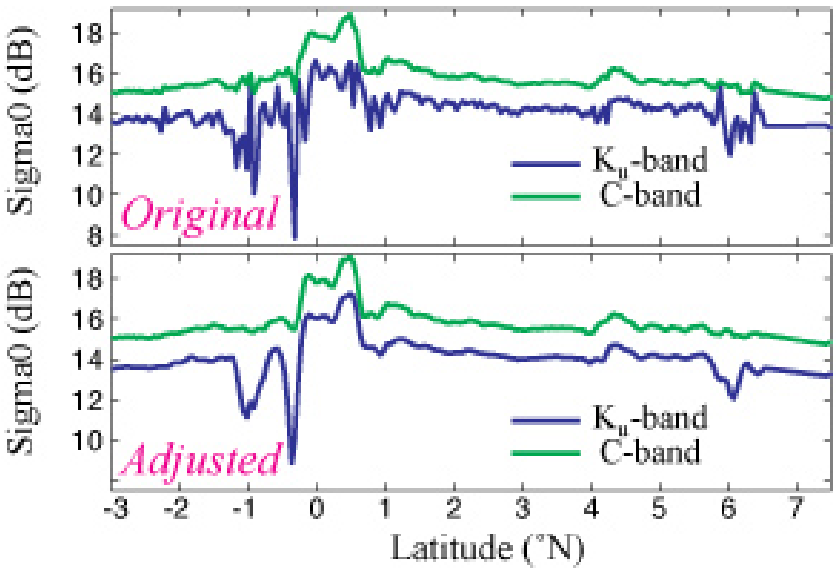
Technique can be applied, noting:

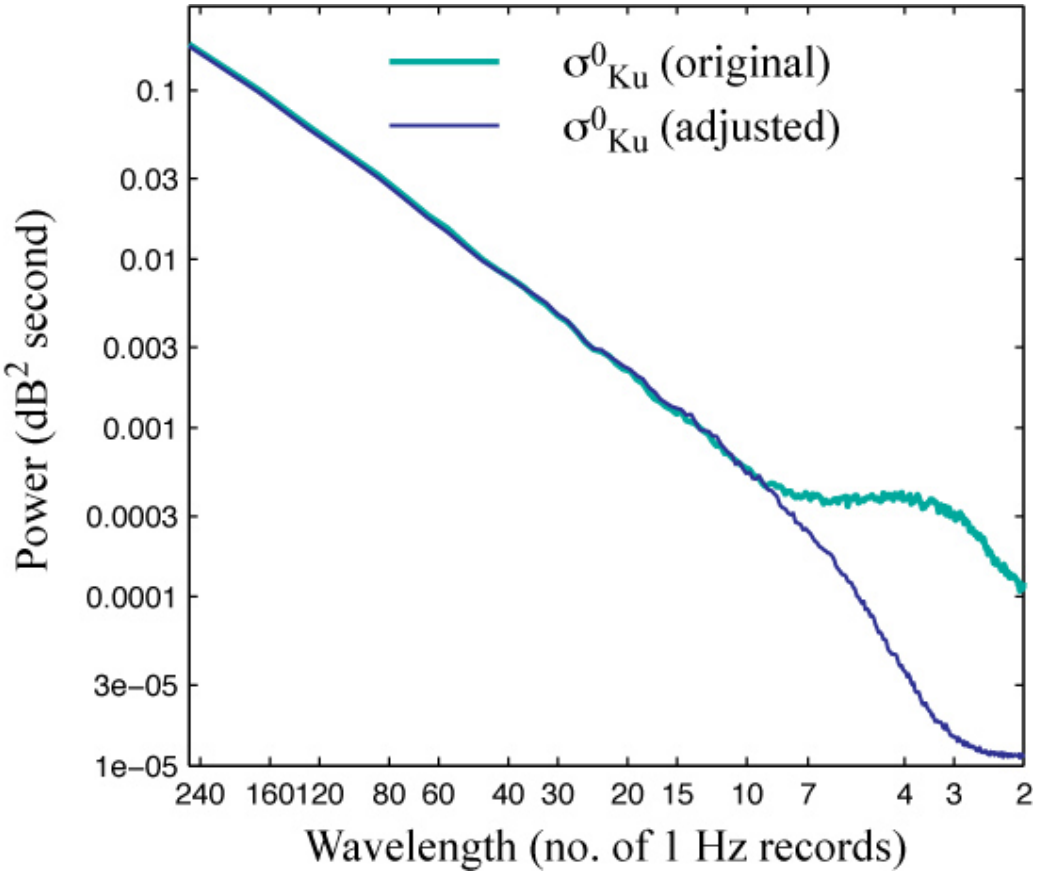
i) Regress $\sigma^0_C$ against $\psi^2$ from Ku-band

ii) Expect smaller response, (beamwidth different)

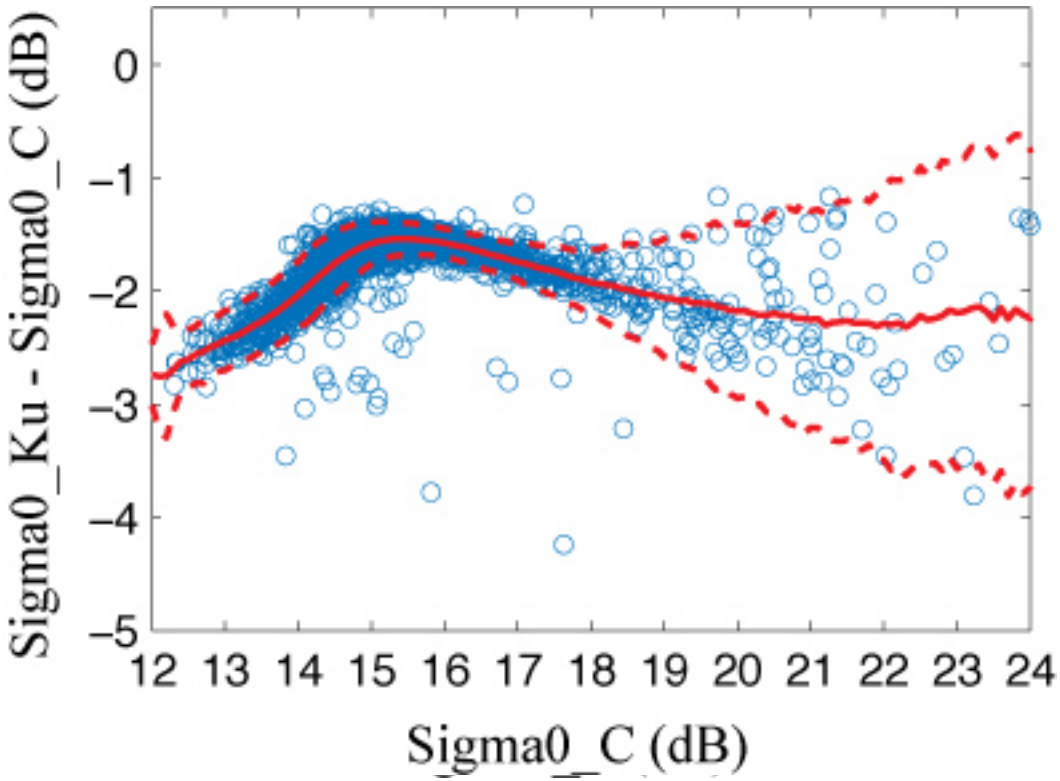


# Effect 1 : Smoother wind profiles



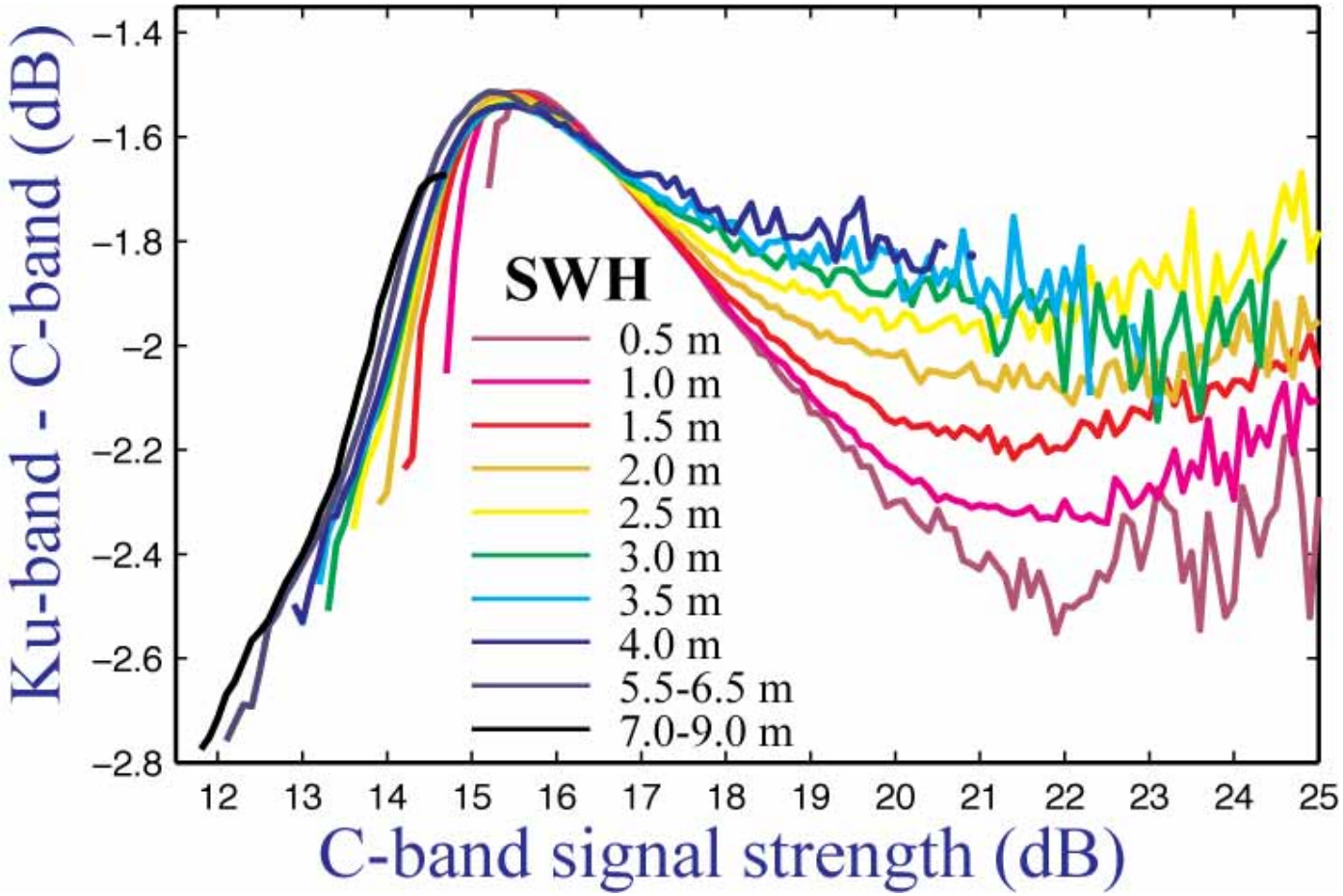



# Effect 2 : Better Ku-C correlation



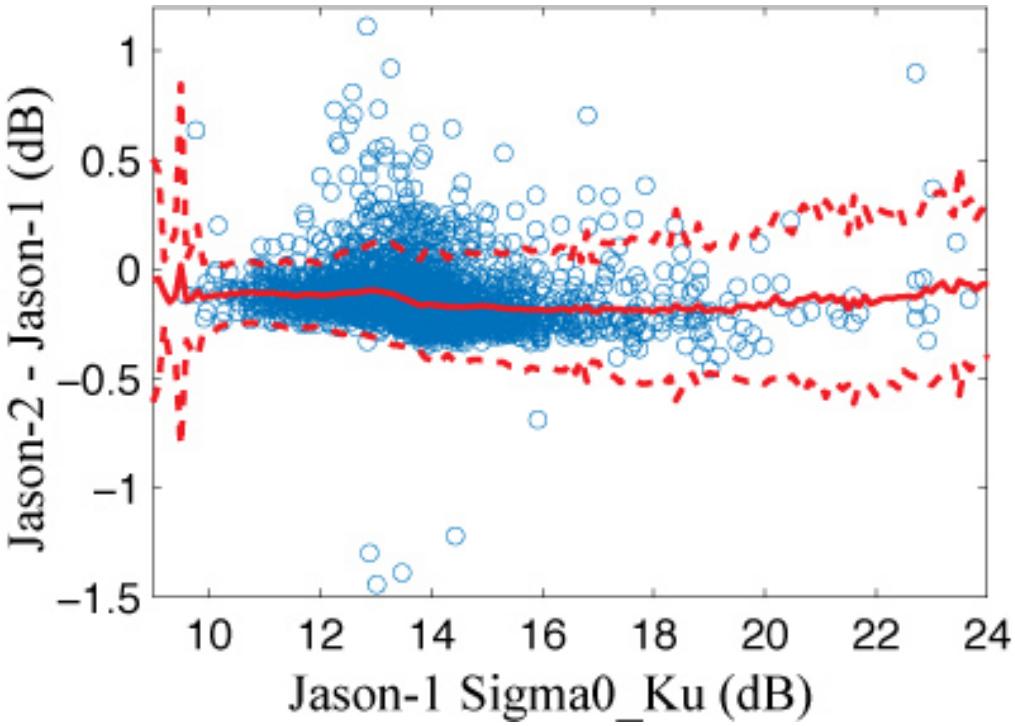
# Effect 2 : Better Ku-C correlation

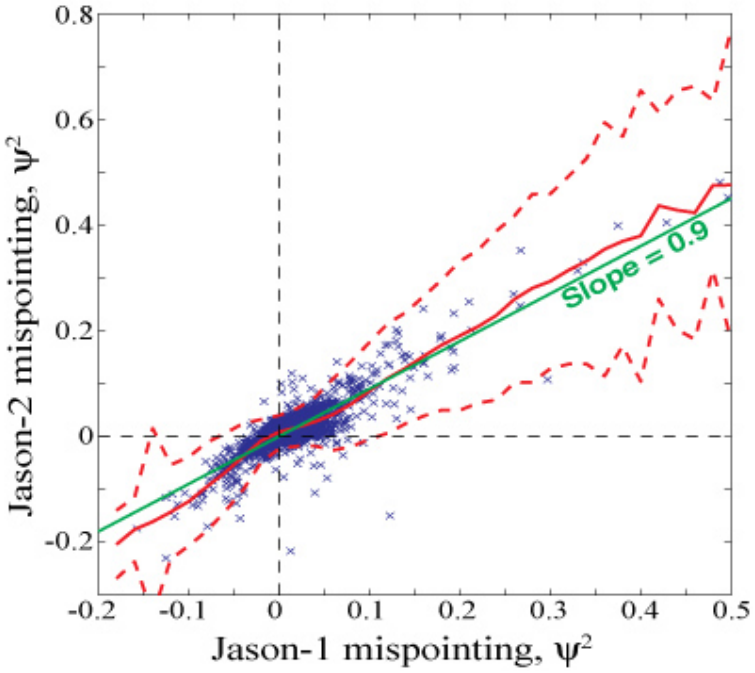
Mean relationship shows a clear wave height dependency




Effect of wave height quite clear at low wind speed;
effect not so apparent with original sigma0 values.

# Effect 3 : Improved intercalibration




Slope = 0.89 ; $r^2$=0.65

Adjustment reduces scatter between J-2 and J-1 observations of $\sigma^0_{Ku}$;
and also gives a mean offset that is not f($\sigma^0_{Ku}$).

# Conclusions

Within 1 Hz ensembles, correlated errors in $\psi^2$ and $\sigma^0$

**Not new! — see Challenor & Srokosz (1989)**

**More meaningful to look at $\sigma^0$ for $\psi^2=0$**

Correlation coefficient near constant ($\alpha_{Ku}$=11.34, $\alpha_C$=2.01)

**Property of waveform tracker used**

Simple adjustment improves

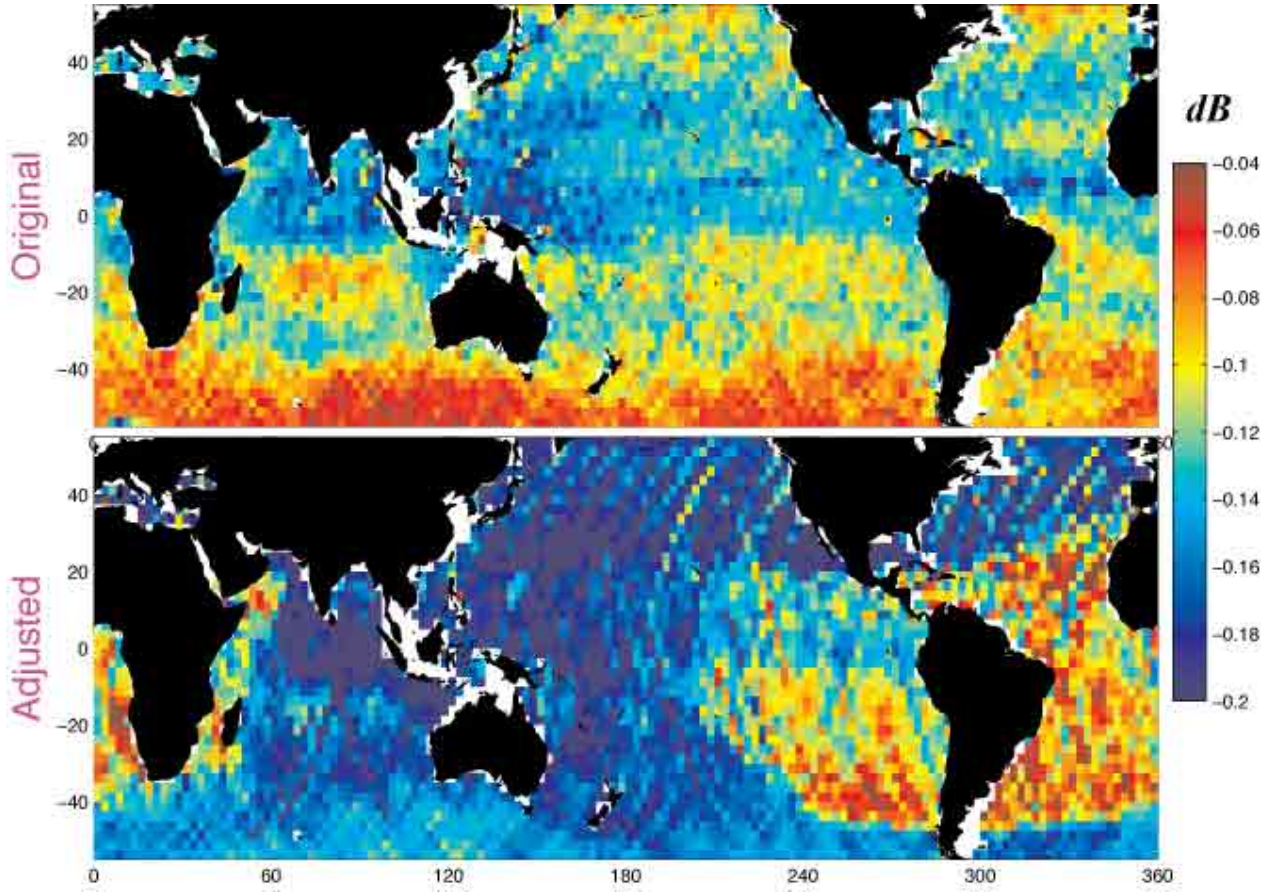
**i) wind speed profiles**

**ii) J1-J2 matchups**

**iii) Rain-flagging**

# Additional - 1

**Geographical comparison of differences in $\sigma^0_{Ku}$ (Jason-2 - Jason-1)**




Maps comparing original $\sigma^0_{Ku}$ show wind bands; adjusted version removes this problem but shows large-scale patterns of Jason-1 mispointing

# The Three Trackers

On-board acquisition trackers

**1) Split-gate (as Jason-1)**

**2) Diode median**

**3) Diode-DEM coupled mode**

Effects:

**a) Positioning of waveform**

**b) Amount of AGC movement**

**c) Slight change in $\psi^2$-$\sigma^0$ correlation**