Caracterisation des glaces de mer par altimetrie

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Data source

CryoSat-2 mission

CNES CPP14 SAR Processor

L1b Processor parameters:

-Data Posting Rate 20Hz

→

L2 Processor:

Retracker 80% Ice1

ESA G-POD SAR Processor

-Data Posting Rate 20Hz/80Hz
-Hamming Weighting Window
-FFT Zero-Padding
-Antenna pattern compensation

→

Retrackers:
Samosa 2,
Samosa Plus

Outline

1. Along track analysis of height variation from different ratrackers

2. L1 SAR processing parametrisation

3. Overall impact of SAR parametrisation on freeboard retrievals

Height variability over leads
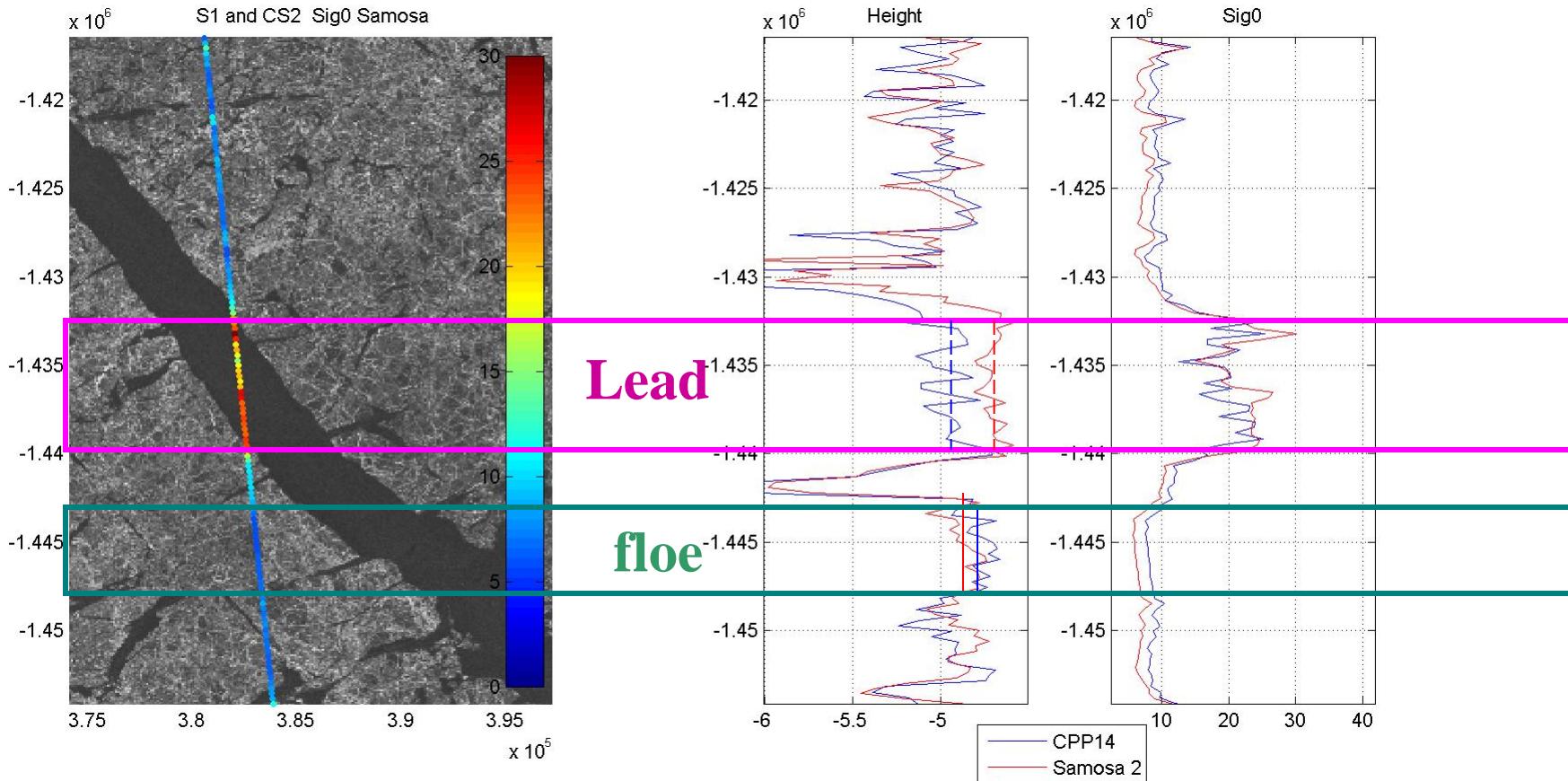

SAMOSA 2 - negative freeboard
CPP14 - low positive freeboard

Height variability over leads
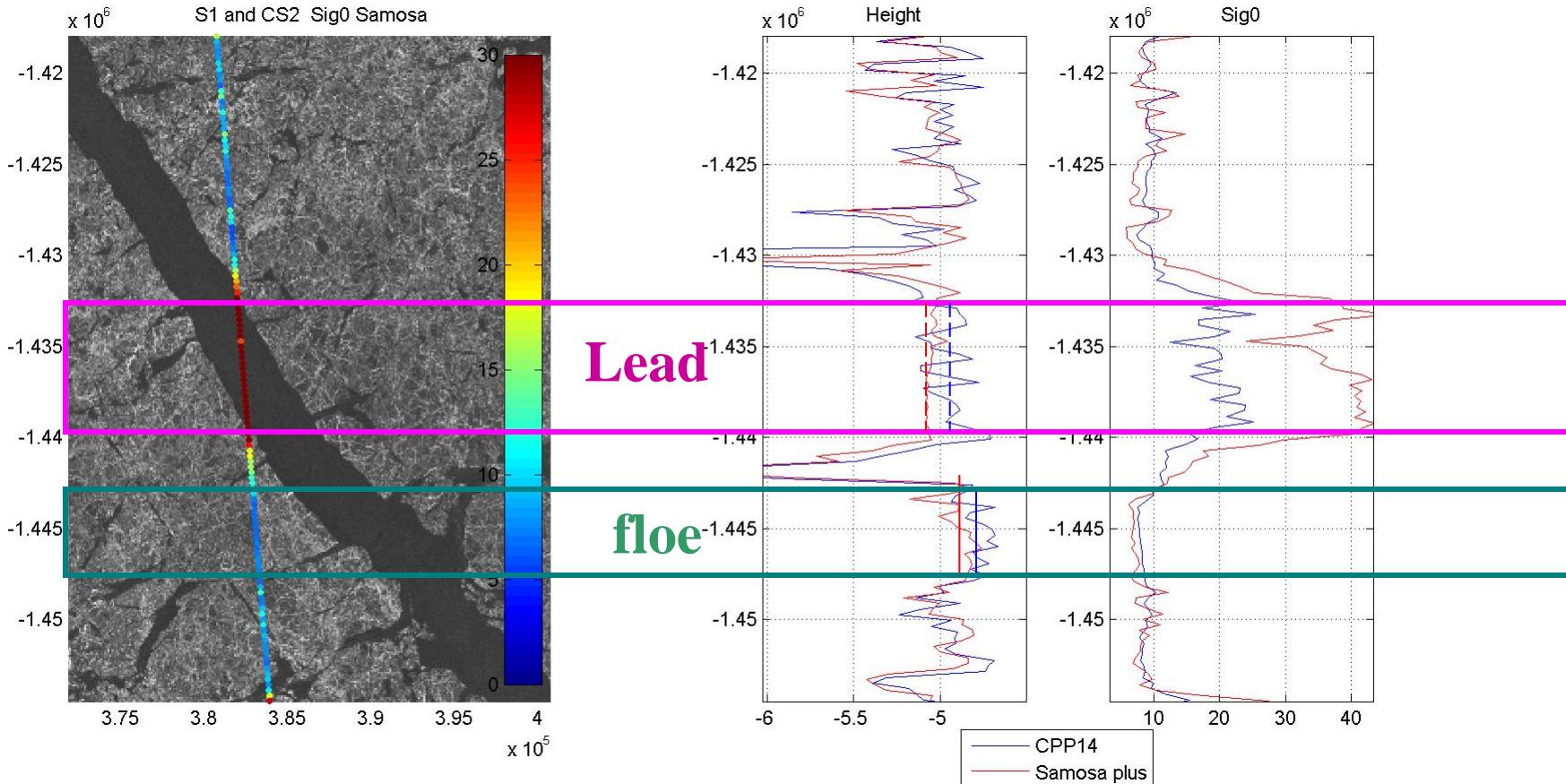
SAMOSA Plus - positive freeboard
CPP14 - low positive freeboard

Height variability over leads

Lead   **Lead**

Height

retracker with 8   hresholds

ICE1 80%

ICE1 50%

CPP14
SamosaPlus

Sig0

50% ICE1 retracker introduces more outliers   **Lead height is lower - freeboard is higher**
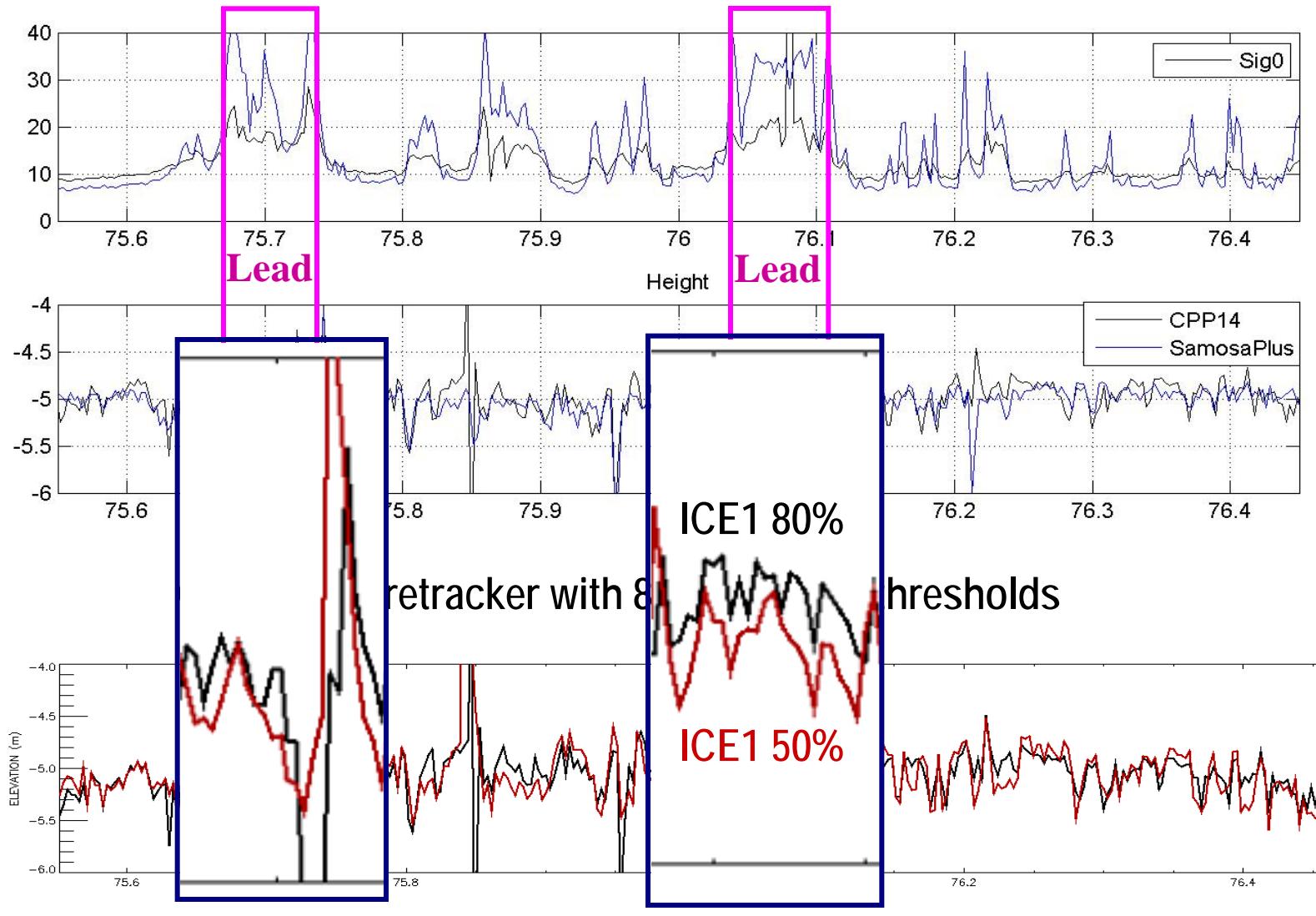
Is it possible to ameliorate the height retrievals using different **SAR** treatment parameters ?

ESA G-POD SAR processor options

-Data Posting Rate 20Hz/80Hz
-Hamming Weighting Window
-FFT Zero-Padding
-Antenna pattern compensation

Hamming Weighting Window application

24-Dec-2014 01:01:26   Track 243

no hamming

Legend: Splus, ShamOff, floe, lead
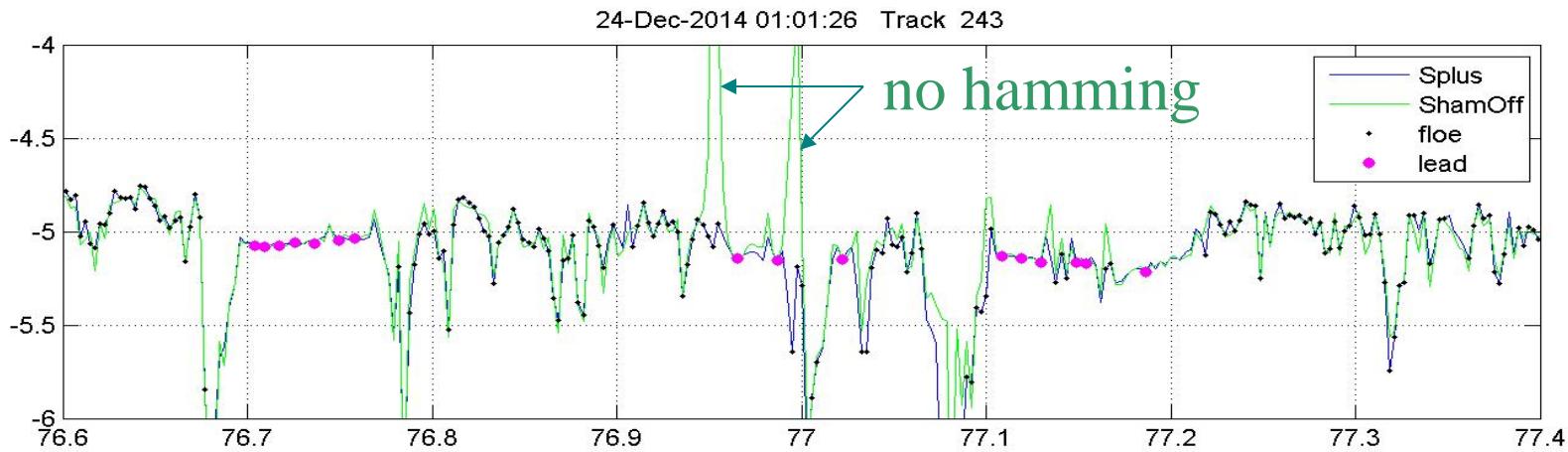
Hamming weighting application removes the positive height outliers.

Hamming Weighting Window application

$$H_{\_Sam\_Plus} - H_{\_Sam\_Plus\_HammOff}$$

dH floes

floes

reduces H of floes

dH leads
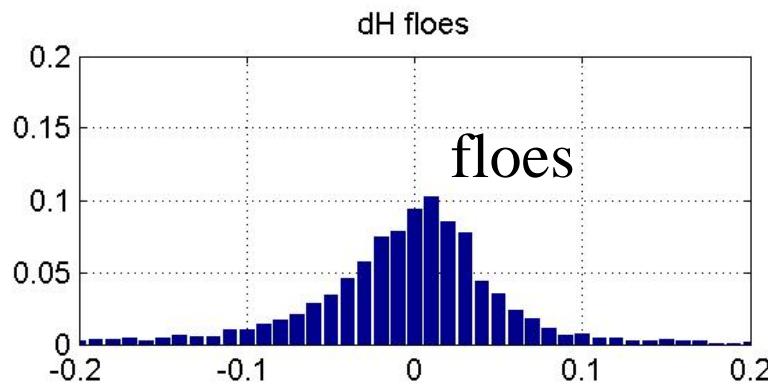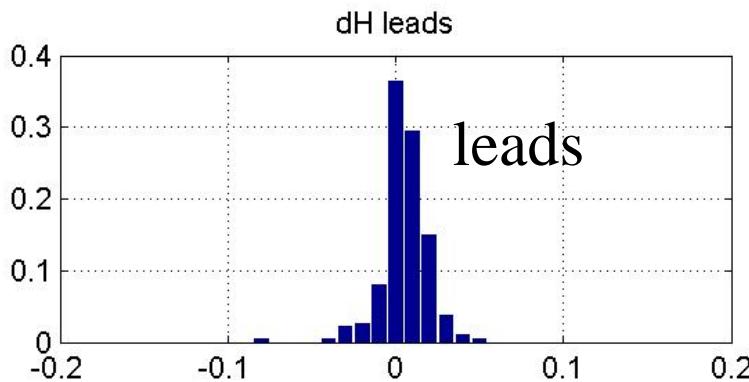
leads

increases H in leads

Waveform Zero-padding application

$$H_{\_Sam\_Plus\_0pad} - H_{\_Sam\_Plus}$$

dH floes
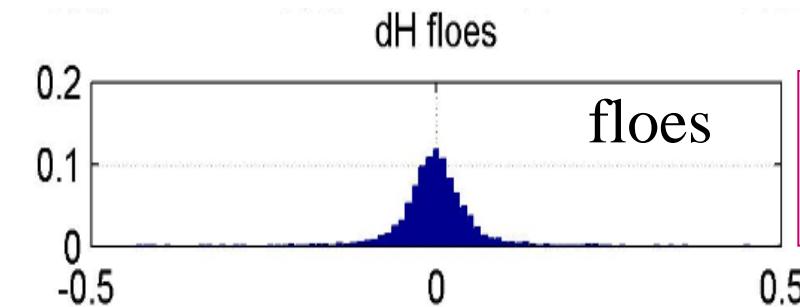
floes

does not affect much H of floes

dH leads
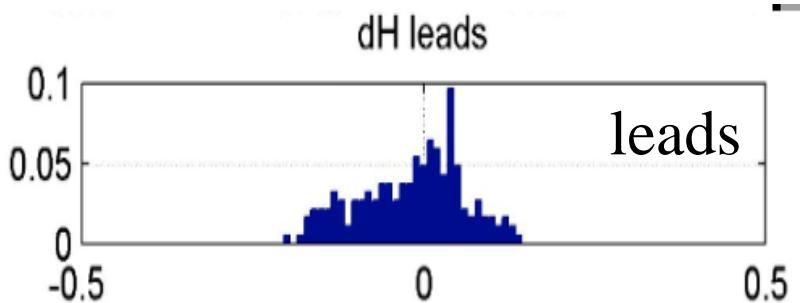
leads

reduces H of leads

Antenna pattern effect

$$H_{\_Sam\_Plus} - H_{\_Sam\_Plus\_AntennaOn}$$

dH floes
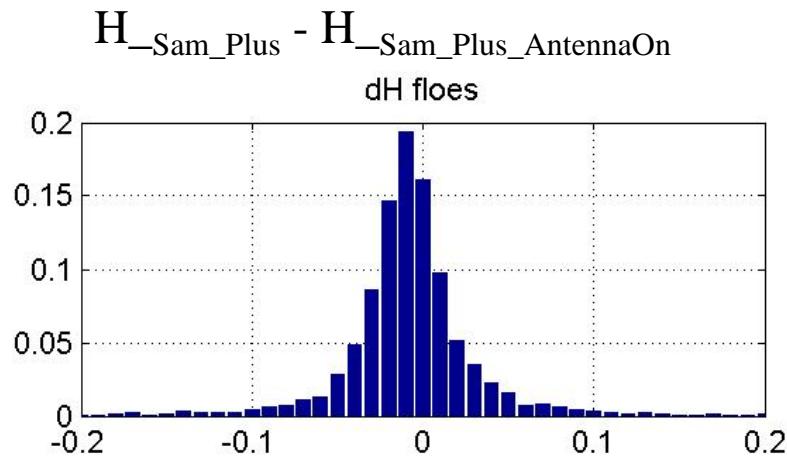
increases H of floes

dH leads
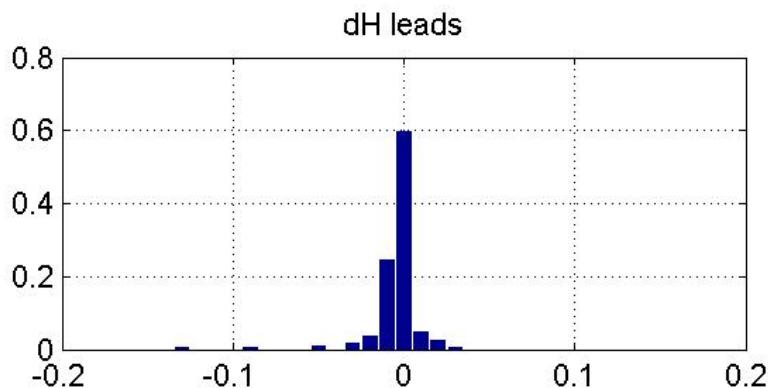
increases H of leads

What is the overall impact of different SAR parameterisation on freeboard retrievals ?

Impact of different parametrisation on freeboard retrievals

Hamming On
0-padding On
Antenna On

S20yyy

S20nyy

S20yyn

S20yny
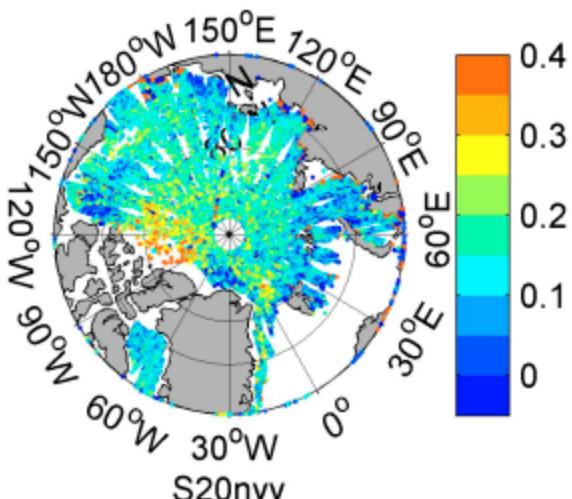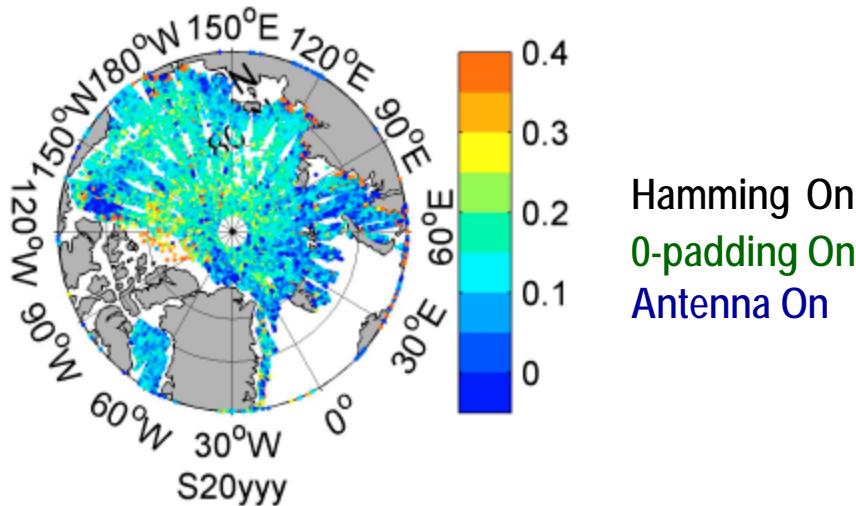
Hamming Off
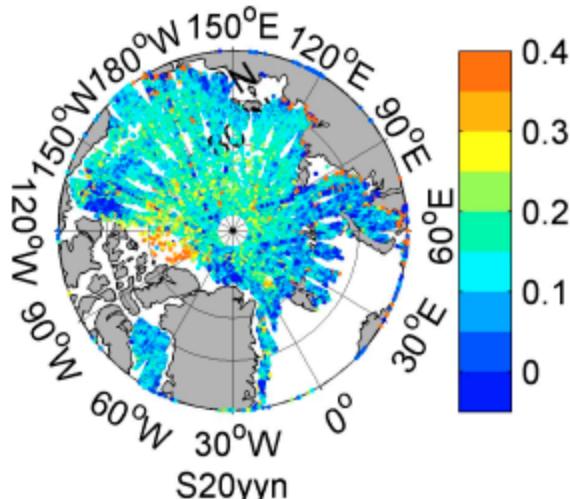
Antenna Off
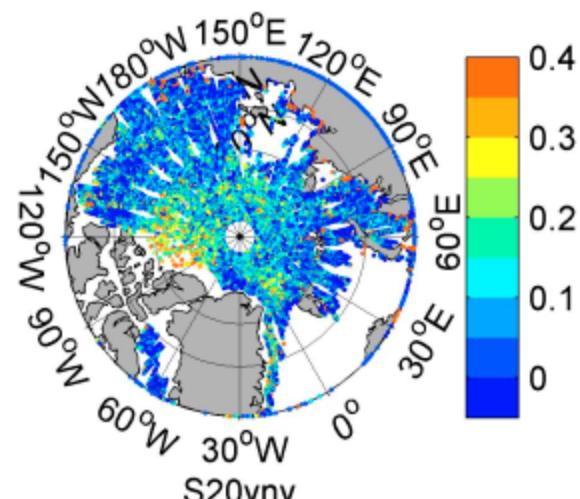
No 0-padding

SAMOSA-Plus freeboard

1. **Hamming weighting slightly reduces freeboard**

2. **0-padding significantly corrects negative freeboard estimates**

3. **Antenna pattern application has low impact**

Freeboard validation

Reference dataset :
Operational Ice Bridge (OIB) airborne campagnes
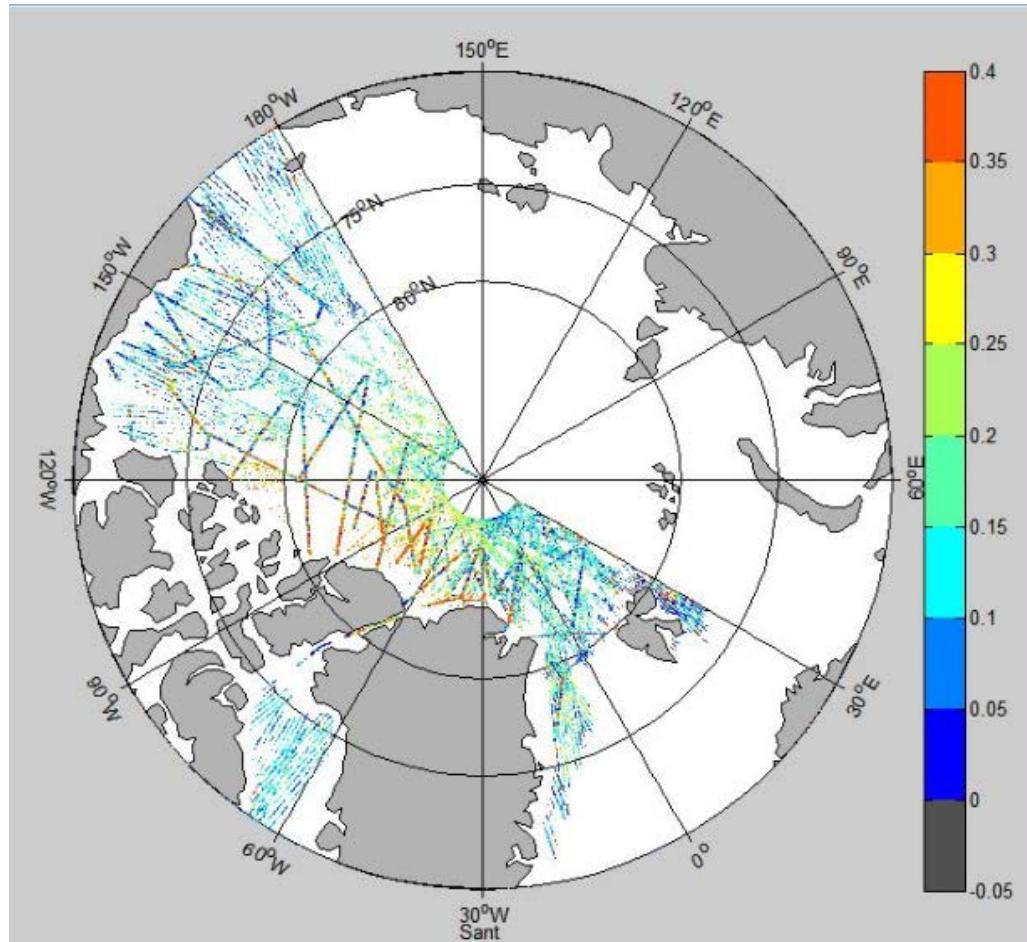
Cryosat Freeboard spring 2014 comparision with OIB freeboard

Freeboard validation

Comparison of CS2 and OIB gridded freeboards
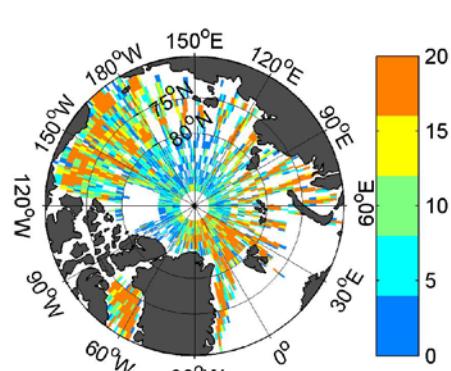
Nobs
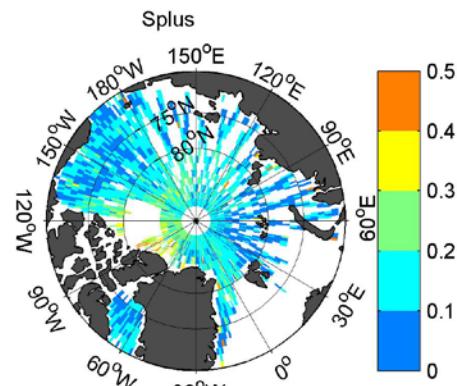
CS2 freeboard
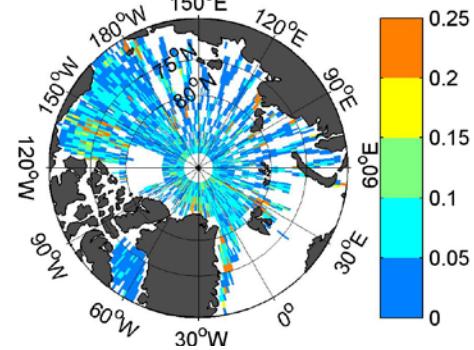
Std CS2 freeboard
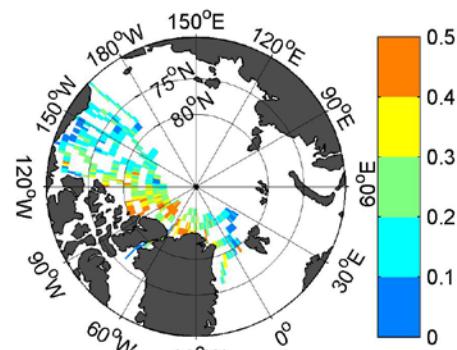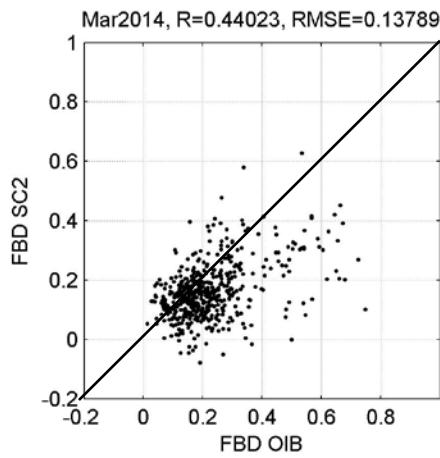
OIB freeboard
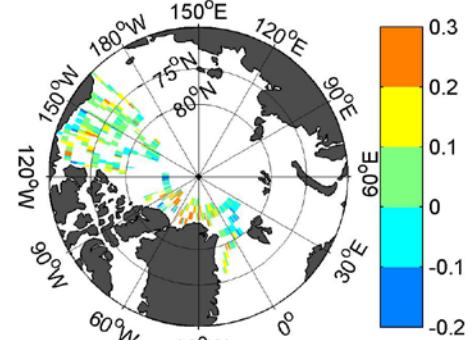
Freeboard bias

Conclusion

1. Physical retracker SAMOSA Plus seems to be better adapted for freeboard estimates, than SAMOSA2 and ICE1.

2. SAR processing configuration impacts the freeboard estimates.

3. Preliminary results of freeboard validation for 2014 show that:

- **hamming weighting can increase negative bias**
- **0-padding increases the correlation but also increases the bias between OIB and CS2 freeboard**
- **different configurations can compensate each other, so optimal configuration can be found.**

Thank you