Comparison of Jason-1 and Jason-2 Sea State Bias

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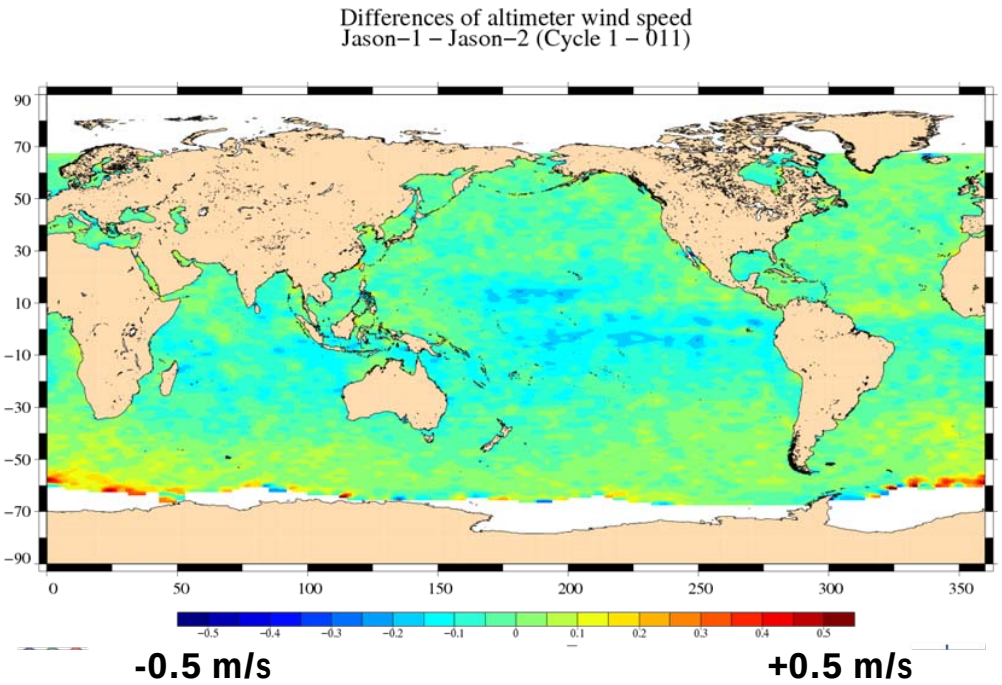
Comparison of Jason-1/Jason-2 SWH and Wind speed

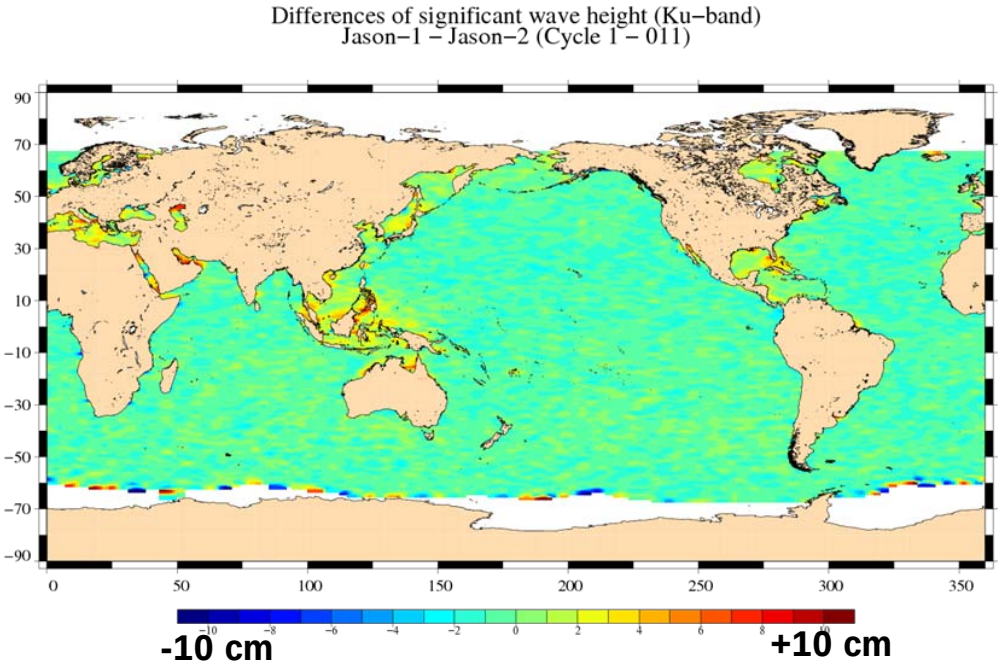


-0.5 m/s **+0.5 m/s**

Mean value = -0.24 m/s

J1 Wind speed - J2 Wind speed

Mean over cycles 1-11



-10 cm **+10 cm**

Mean value = -1 cm

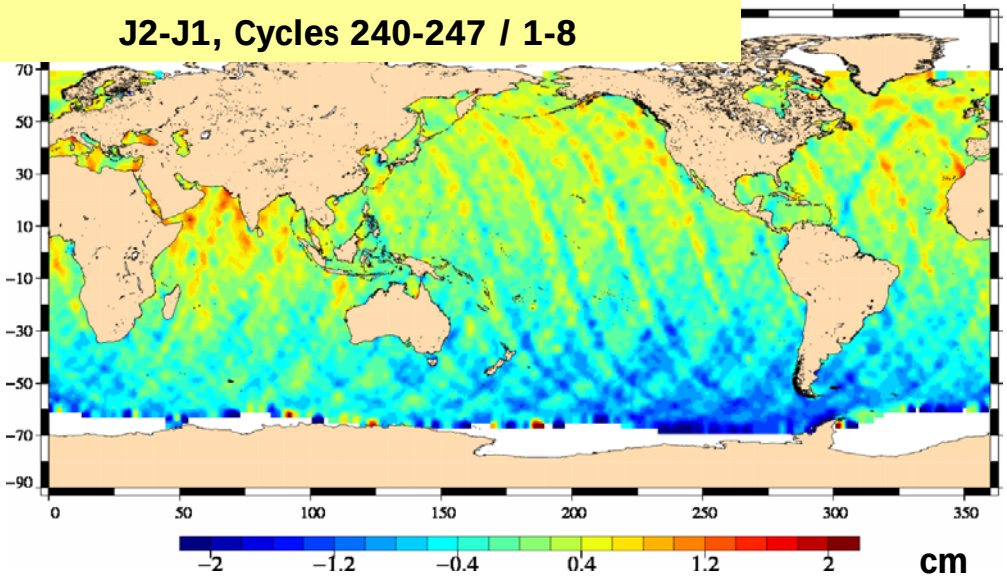
J1 SWH - J2 SWH

Mean over cycles 1-11

Comparison of Jason-1 and Jason-2 SLAs

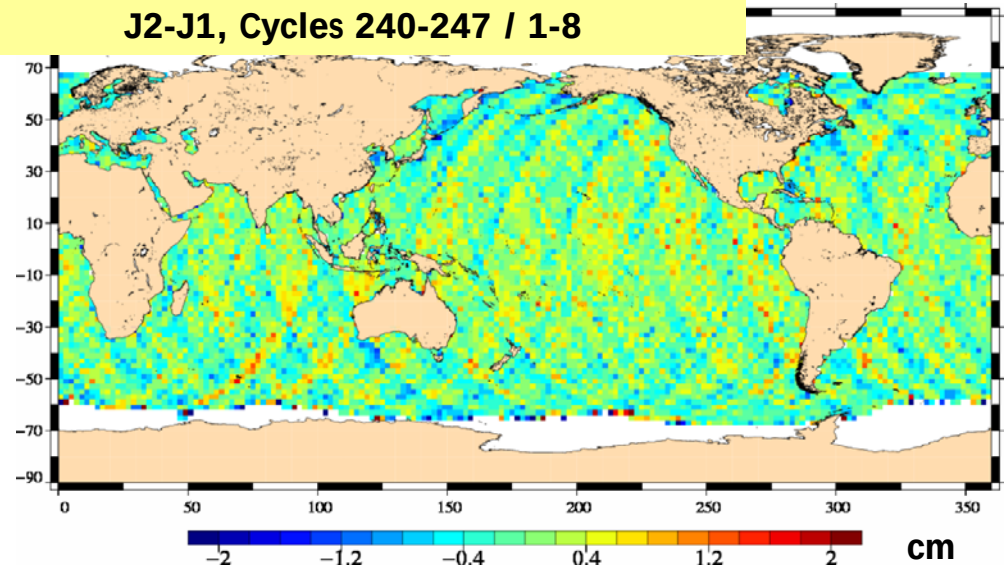
POE Orbit - Range (CNES orbits on J1 and J2)

J2-J1, Cycles 240-247 / 1-8



POE Orbit - Range (GSFC orbits on J1 and J2)

J2-J1, Cycles 240-247 / 1-8

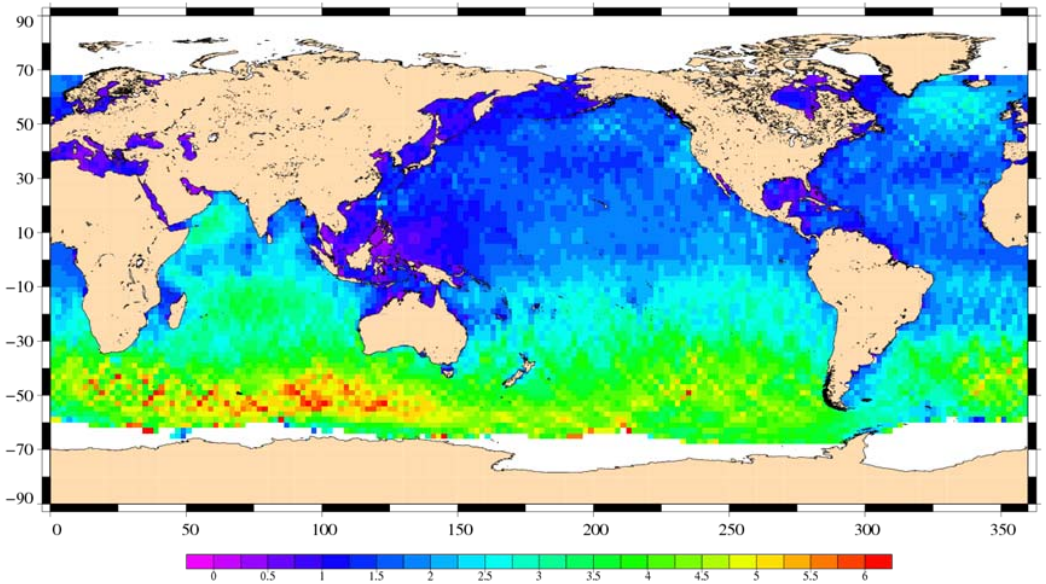


Analysis with POE orbits on J1 and J2 do not show any correlation with waves.

Small signal between -1 cm and +1 cm which changes dependong on the used orbits (CNES POE vs GSFC POE).

The geographic analysis shows a very good consistency between J1 and J2

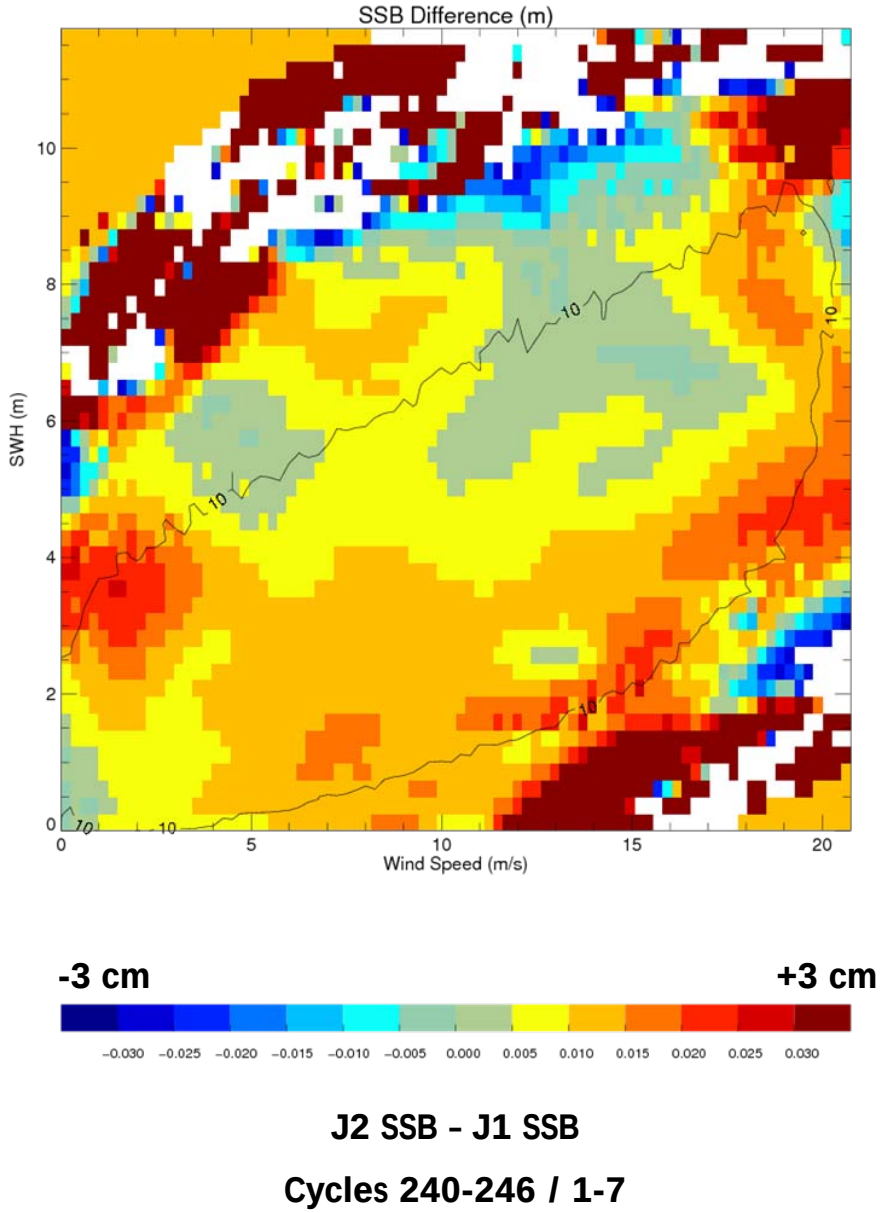
=> no tracker bias between both altimeters.



Mean over cycles 240-246

Comparison of Jason-1 and Jason-2 SSB

- SSB is estimated on the same period for both missions (Cycles 240-246)
- Use of POE orbits on both data sets (CNES orbit)
- Estimation with collinear approach (10 day differences)
- Use of 7 cycles only
- Systematic orbit errors are cancelled thanks to 10 day differences
- Constant bias of +1 cm between both SSB, due to the small amount of data (too few measurements at very low sea states)



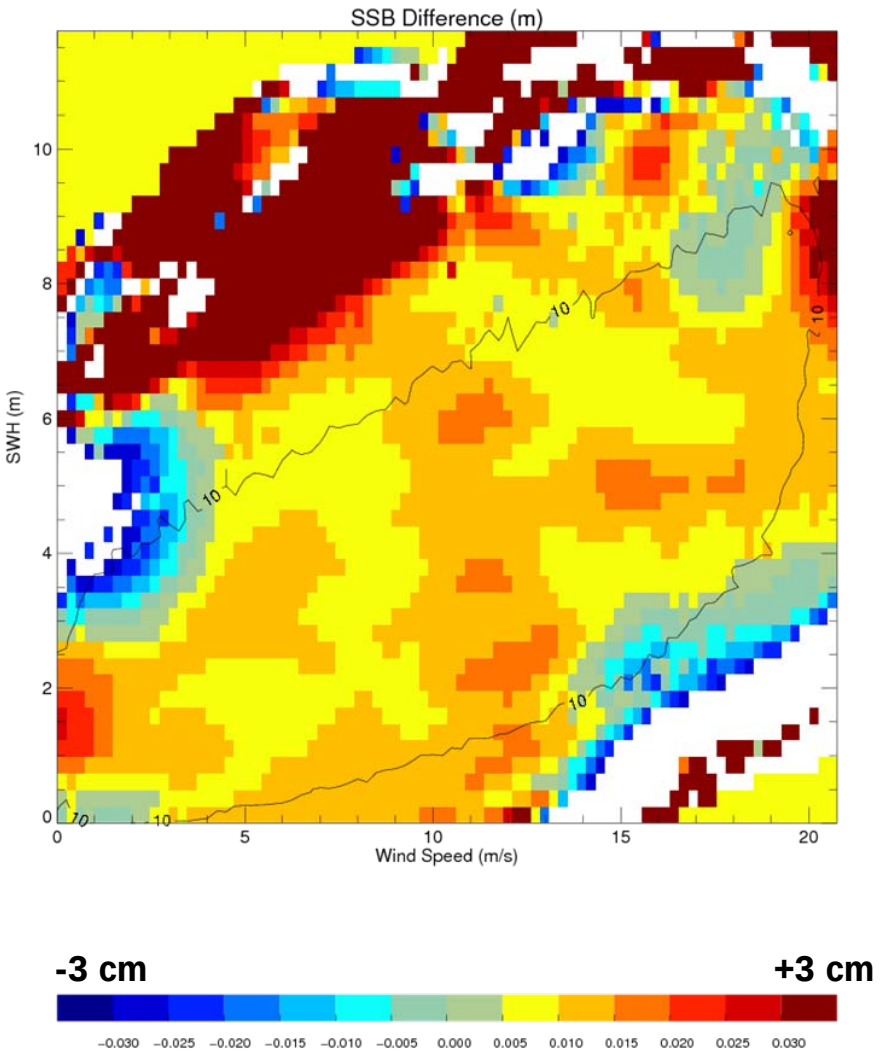
J2 SSB - J1 SSB

Cycles 240-246 / 1-7

=> Same SSB is obtained for J1 and J2

=> There is no tracker bias between J1 and J2

Impact of the MOE/POE orbits on Jason-2 SSB

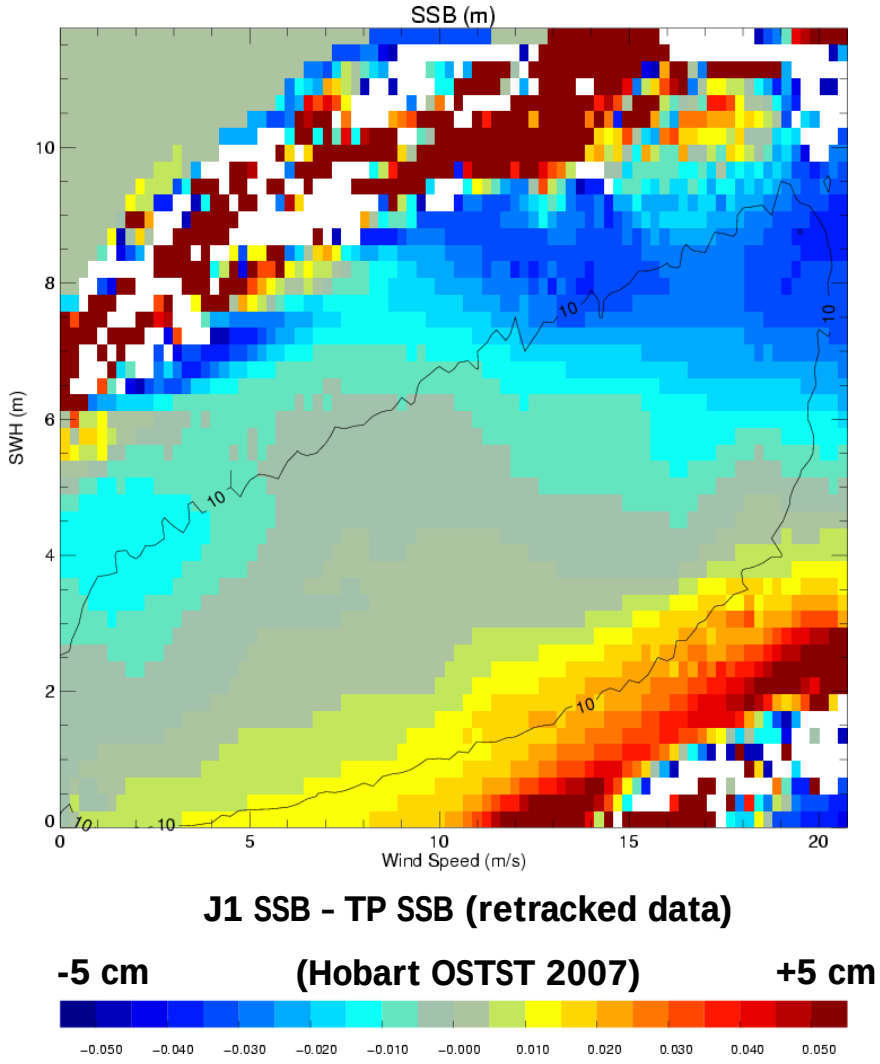


J2 SSB with MOE orbit - J2 SSB with POE orbit

Cycles 1-7

=> SSB model obtained with MOE orbit is in good agreement with SSB obtained with POE orbit, thanks to the collinear approach that removes MOE and POE orbit errors.

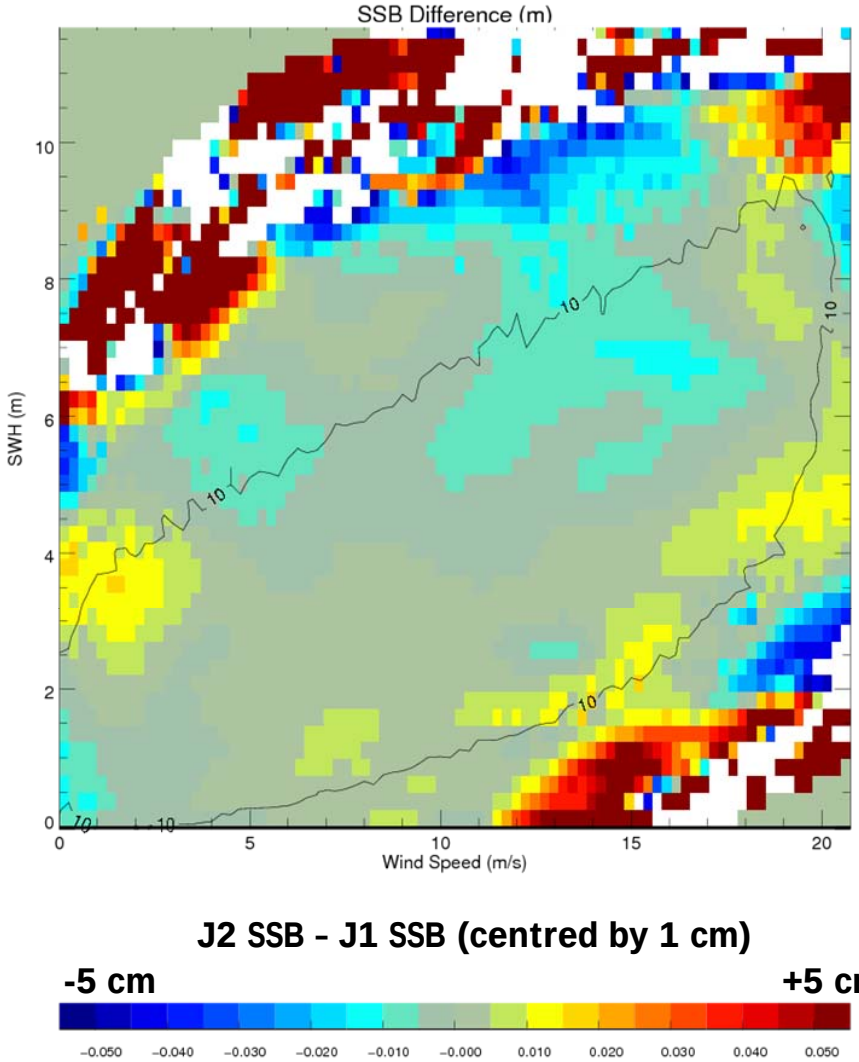
Status on J1 and J2 SSB consistency - Conclusion



J1 SSB - TP SSB (retracked data)

-5 cm **(Hobart OSTST 2007)** **+5 cm**

−0.050 −0.040 −0.030 −0.020 −0.010 −0.000 0.010 0.020 0.030 0.040 0.050



J2 SSB - J1 SSB (centred by 1 cm)

-5 cm **+5 cm**

−0.050 −0.040 −0.030 −0.020 −0.010 −0.000 0.010 0.020 0.030 0.040 0.050

With only four months of data (J2-J1), we are at the same level of agreement than the obtained between J1 and TOPEX after 5 years of studies ….

POSTER TO SEE

REVISITING THE OCEANIC VARIABILITY IMPACT FOR SEA STATE BIAS EMPIRICAL ESTIMATION

Work motivated by 2 issues:

Issue 1 : Understand the differences between direct SSB estimation and collinear/crossover SSB estimation

- Status of the different SSB estimates on Topex, Jason-1 and EnviSat
- Analysis of oceanic variability

Issue 2 : The direct methodology is of interest

- for future SSB estimations : use of wave model parameters and classification
- for SSB estimation in coastal zones

The equations

$$SSH = h_g + SSB + \eta + w$$

Differences method

$$SSH'_2 - SSH'_1 = SSB_2 - SSB_1 + \varepsilon$$

- One usually assumes that
  - The residual errors ε have no correlation with sea state
  - The oceanic variability is considered as random noise thanks to the temporal differences (10 days with collinear and between 3 and 10 days at crossovers)

Direct method

$$SSH - MSS = SSB + \eta - \hat{\eta} + w$$

- One usually assumes that
  - The residual errors w have no correlation with sea state
  - The oceanic variability $\eta - \hat{\eta}$ has no correlation with sea state, by averaging over long periods and on a global scale

$$E\left[(\eta - \hat{\eta}) \mid (U, SWH)\right] = 0$$

Correlation with oceanic variability

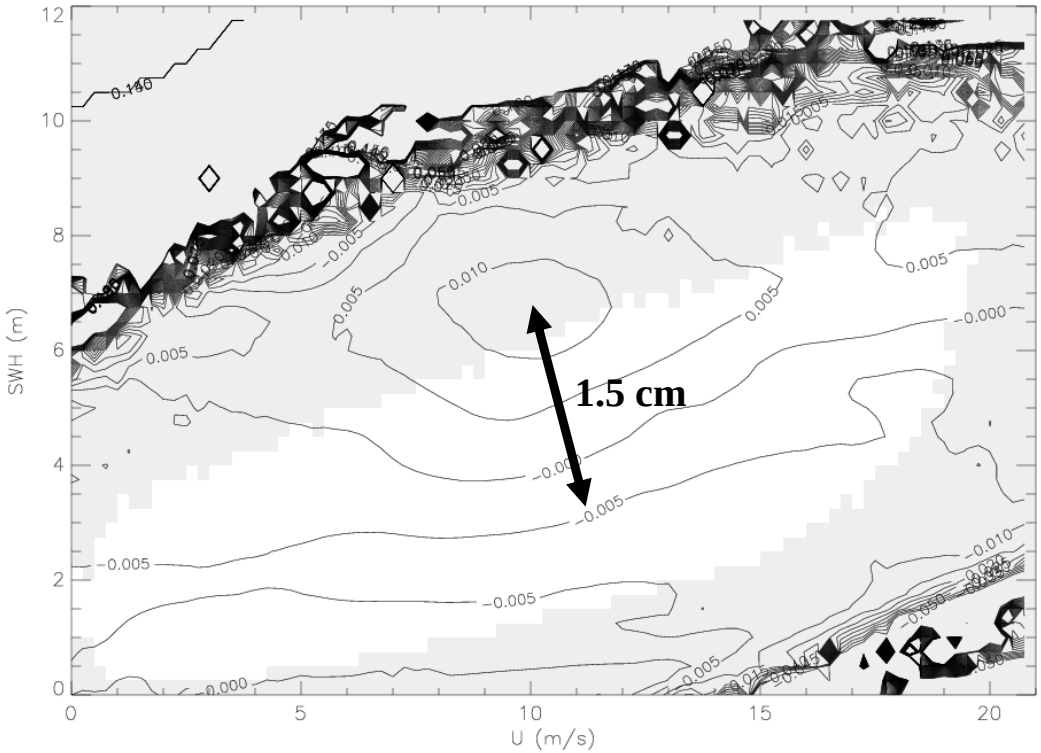
Analysis of the MSLA products from DUACS

MSLA= Map of $\eta - \hat{\eta}$

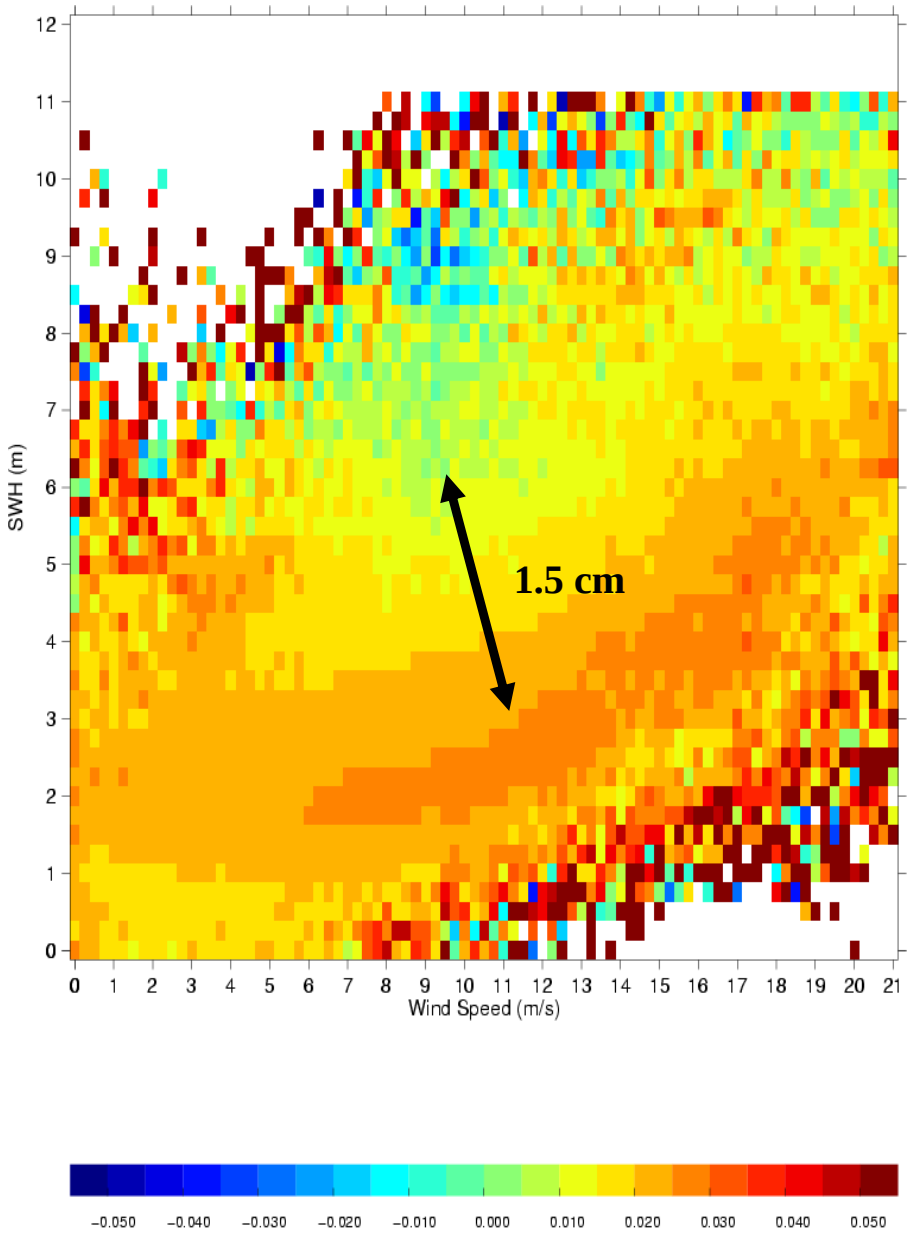
Multi mission products (TP,J1,EN,GFO) => SSH minus mean profile

Recent analysis in 2008 (off line products)

Interpolation of the maps at J1 location and time tag



SSB difference : Collinear - Direct
Jason (1-111)

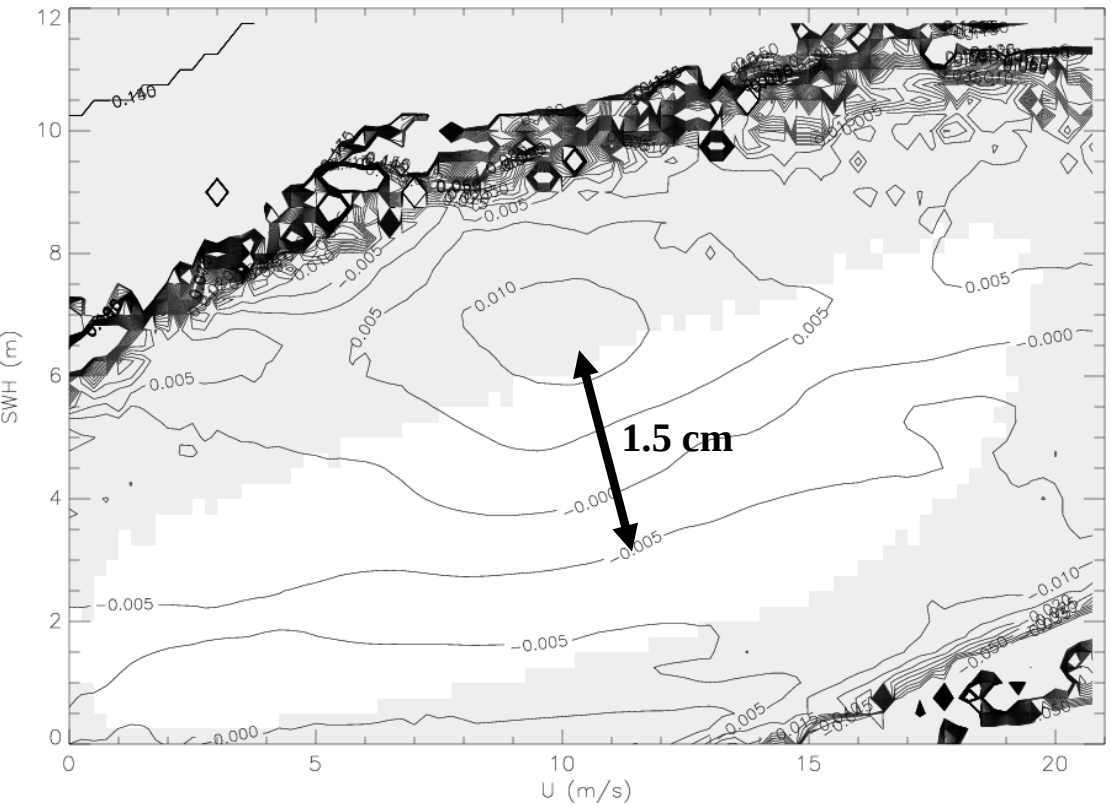


MSLA, Jason-1 (1-110)

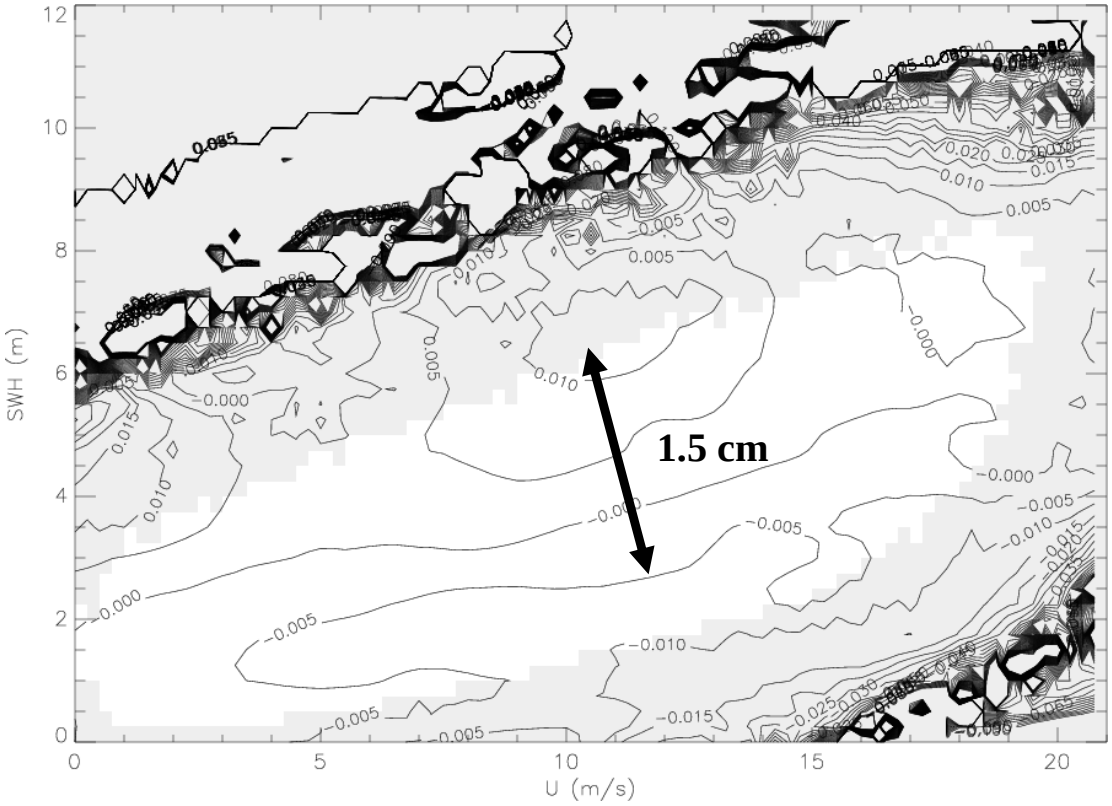
$$E\left[(\eta - \hat{\eta}) \mid (U, SWH)\right] \neq 0$$

Status of the SSB difference

Same behaviour for Topex and Jason-1 on SSB difference between collinear and direct estimates



SSB difference : Collinear – Direct
Jason (1-111)



SSB difference : Collinear – Direct
Topex A (21-131)
MGDR data with updated DAC correction

TWO MORE POSTERS ABOUT SSB TO SEE …

- **Update on Jason-1 sea state bias modeling from combination of wave model and satellite data** by Tran et al.

- **Altimetry and operational wind-wave prediction - combined use to enhance both systems** by Vandemark et al.