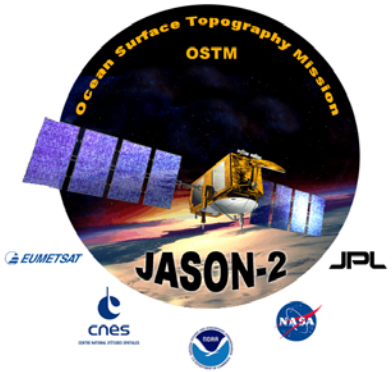

Jason-2 and Jason-1 SLA performances and consistency

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Introduction

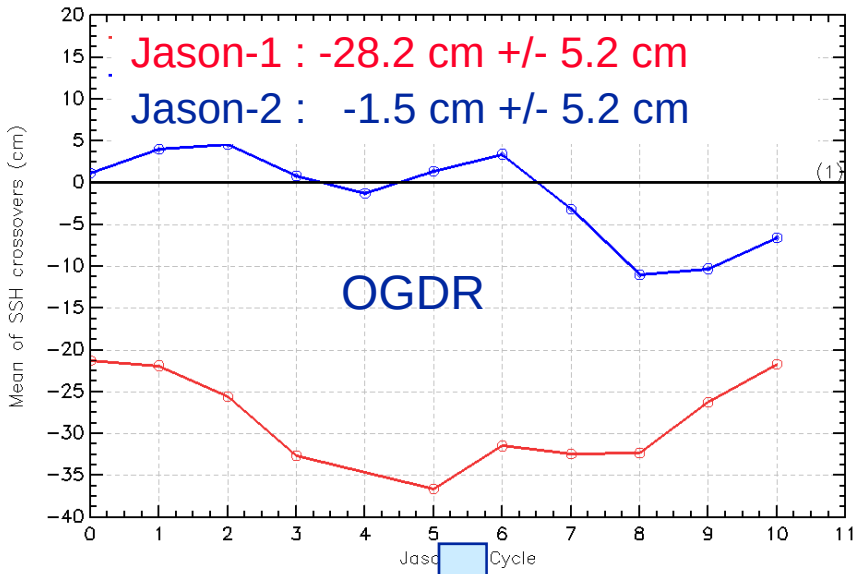
- Objective : compare accurately the SLA performances and consistency between Jason-1 and Jason-2

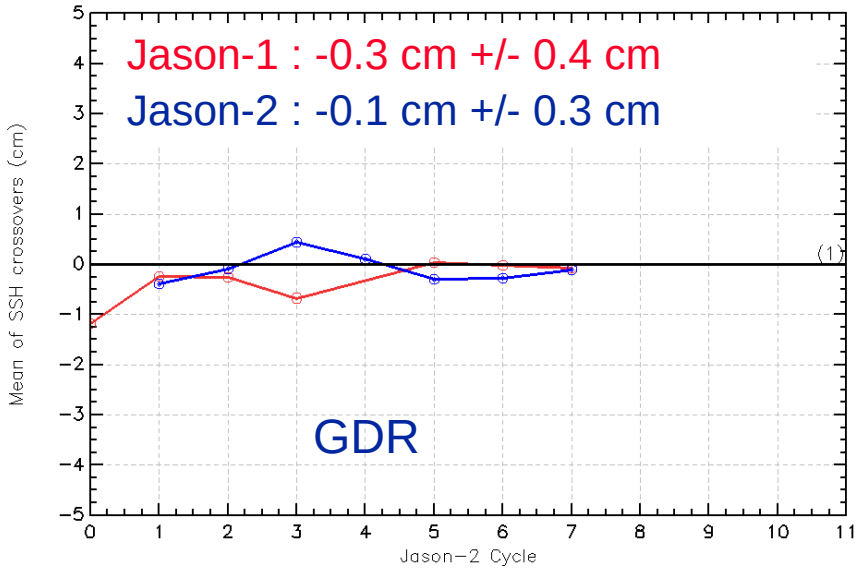
- In this presentation, we concentrate on:
  - 1) Analyses at crossovers using OGDR, IGDR and preliminary POE orbits
  - 2) Along-track analyses of global SLA bias and geographically correlated biases between Jason-1 and Jason-2

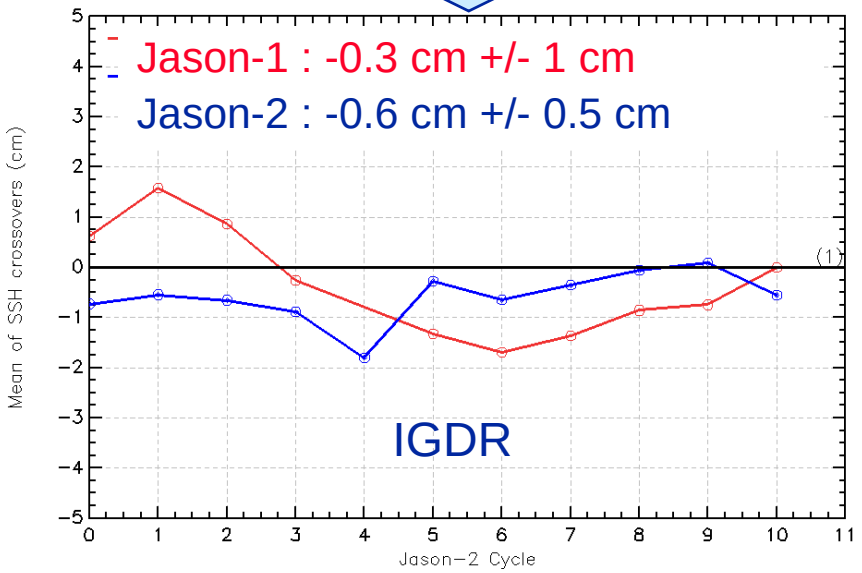
- Data used :
  - OGDRs and IGDRs from Jason-2 cycles 0 to 10 (corresponding cycles 239 to 249 for Jason-1)
  - Preliminary POE orbits (provided by CNES and GSFC) from cycles 1 to 7

SSH Mean at crossovers

- OGDRs : strong improvement with J2 SSH, better centered.
- IGDRs : slightly better centered and stable for Jason-2.
- GDRs (using POE CNES for J2) : similar statistics for both missions.

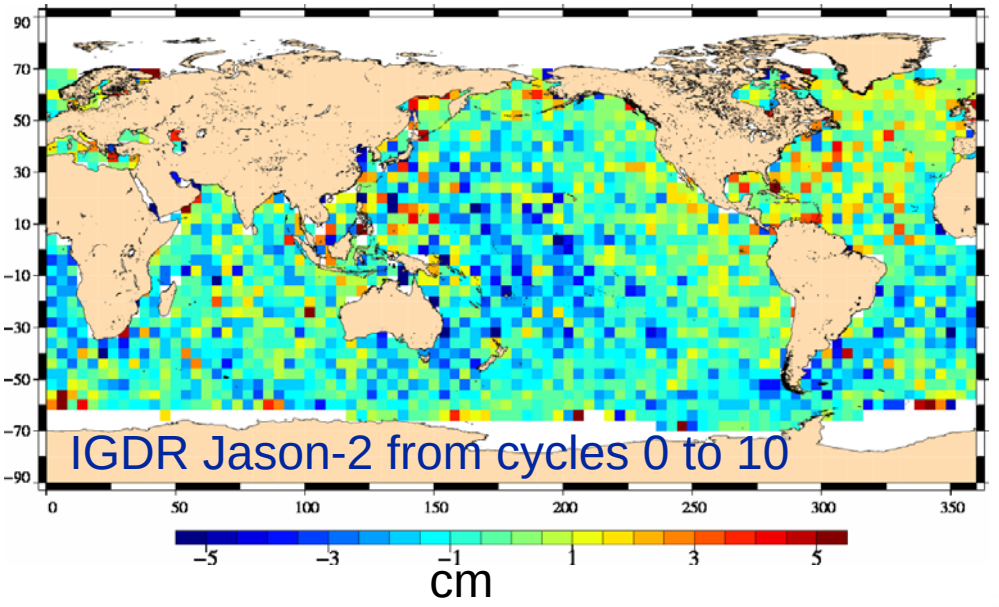






SSH mean at crossovers

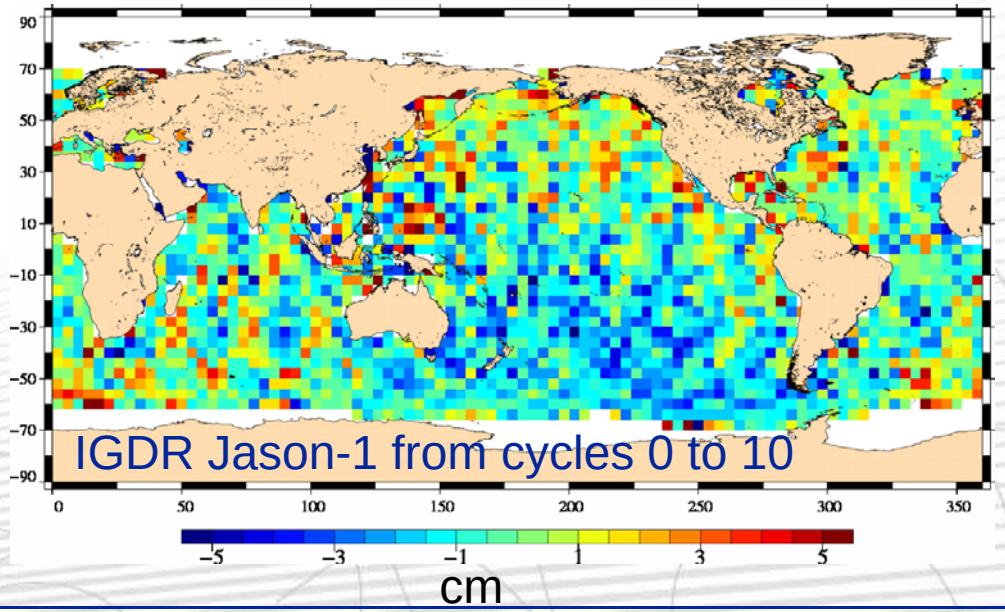
- Map of SSH mean at crossovers are performed from cycles 0 to 10 using IGDRs Jason-1 and Jason-2



- Positive and negative structures are visible for Jason-1 and Jason-2, however :

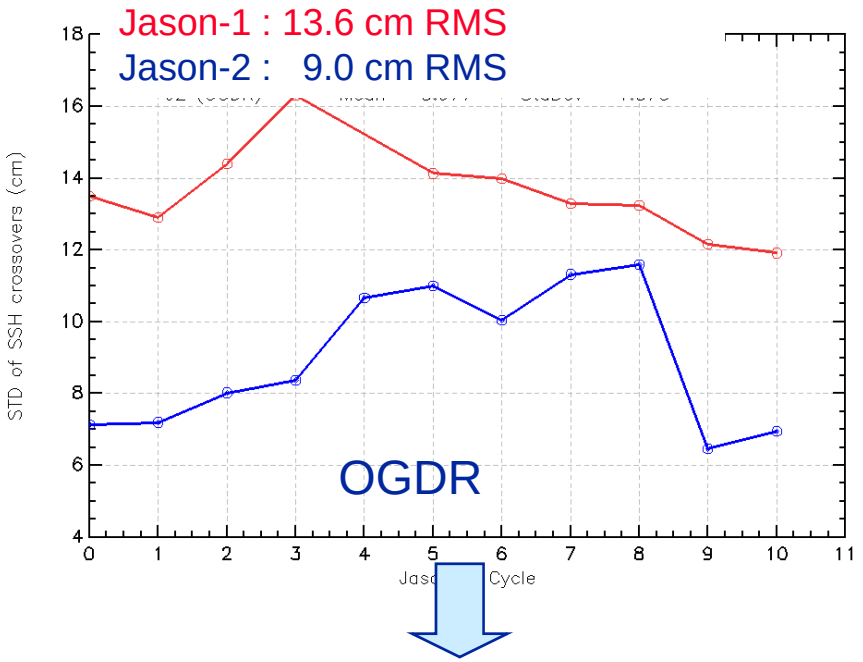
⇒ Jason-2 map is more homogeneous

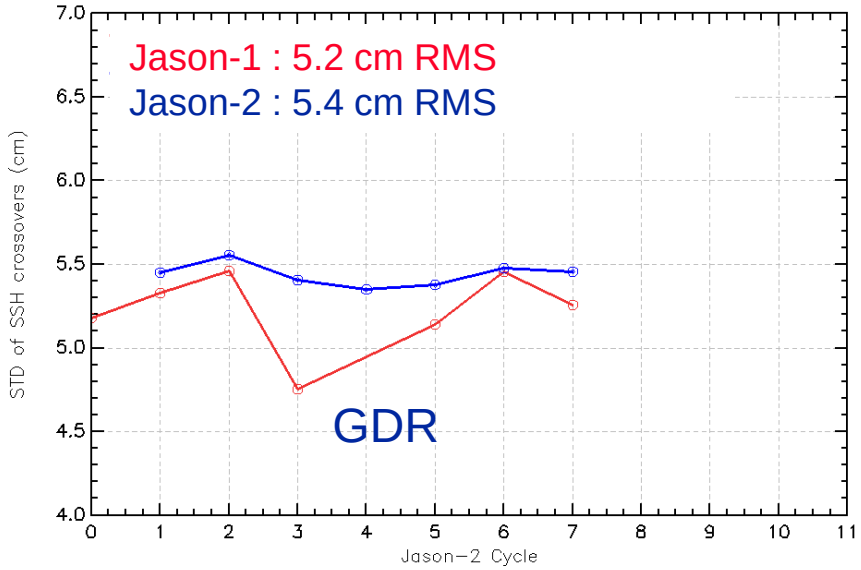
⇒ Positive structures are stronger for Jason-1

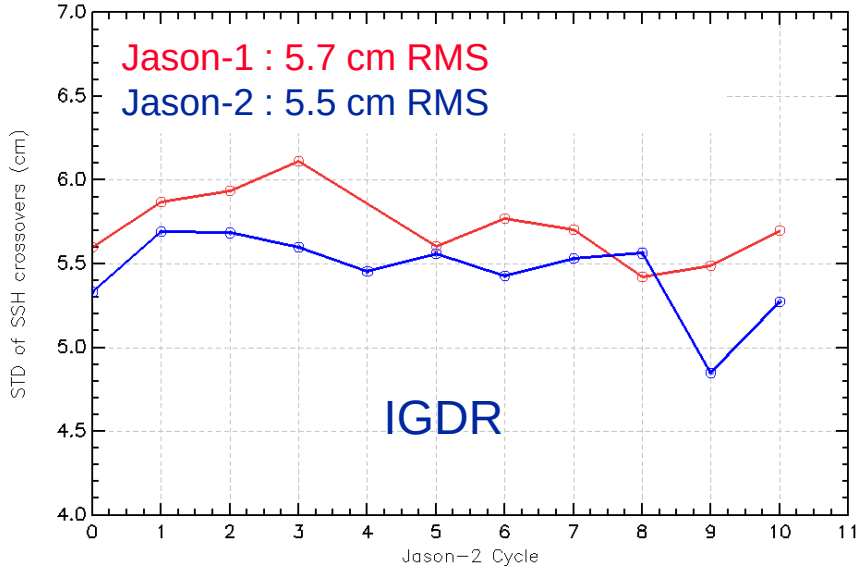


SSH STD at crossovers

- OGDR : strong variance reduction with Jason-2 OGDRs thanks to the DIODE orbit
- IGDRS : Slightly better performances with Jason-2
- GDRs (using preliminary POE CNES for J2): slightly better performances with Jason-1 GDRs.







Summary of SSH crossovers analysis

- Jason-2 SSH performances are very good at crossovers

- OGDR: DIODE orbit increases significantly the SSH performances in comparison with Jason-1

- Small differences detected from IGDRs and GDRs products are mainly due to orbit calculation differences:

  ⇒ Better performances with MOE Jason-2

  ⇒ Slightly better performances with POE Jason-1, but POE Jason-2 is preliminary.

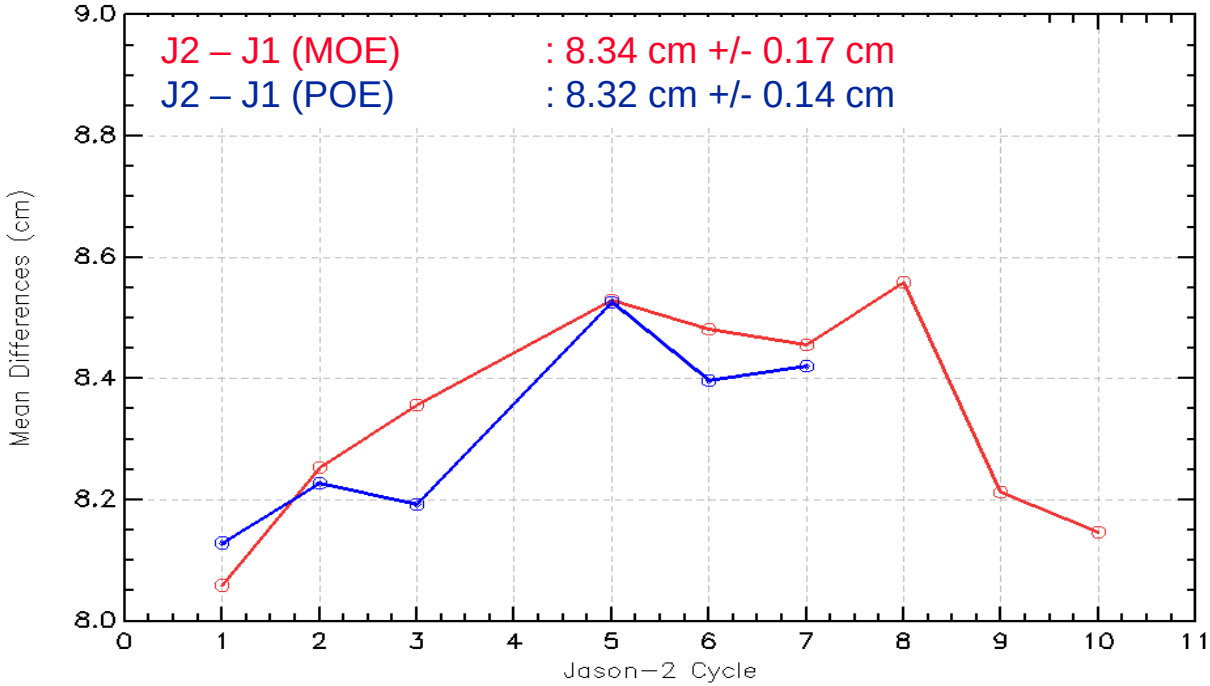
Global SSH bias between Jason-1 and Jason-2

- During the verification phase, both satellites are spaced out by 54s
  - ⇒ They measure exactly the same SSH
  - ⇒ SLA differences are thus computed without applying any correction : SLA = Orbit - Range - MSS

- Global bias between J2 and J1 is stable with weak variations : 8.3 cm +/- 0.2

- Weak impact using the MOE or POE orbits.

- Applying all the corrections, the bias is lower : 7.5 cm (due to ionospheric correction bias)



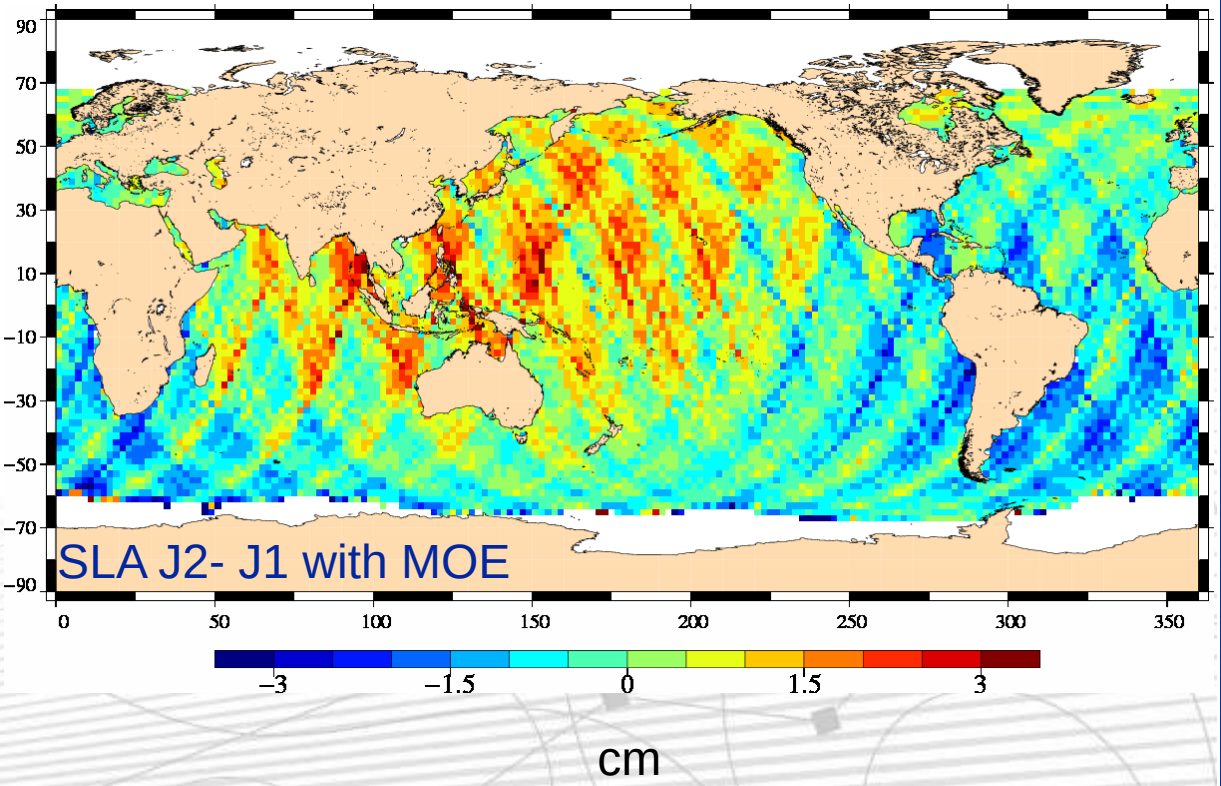
SLA consistency between Jason-1 and Jason-2

- Map of mean of J2 – J1 SLA differences performed over all the period
  ⇒From cycles 1 to 10 with IGDRs (CNES MOE)

- SLA differences with CNES MOE orbits highlight large structures (+/- 3 cm)

- These biases vary in space and time (for each cycle) and they can reach +/- 5 cm.

- Cross-calibration with Envisat shows a better SLA consistency with Jason-2 than with Jason-1 (see Ollivier's talk).



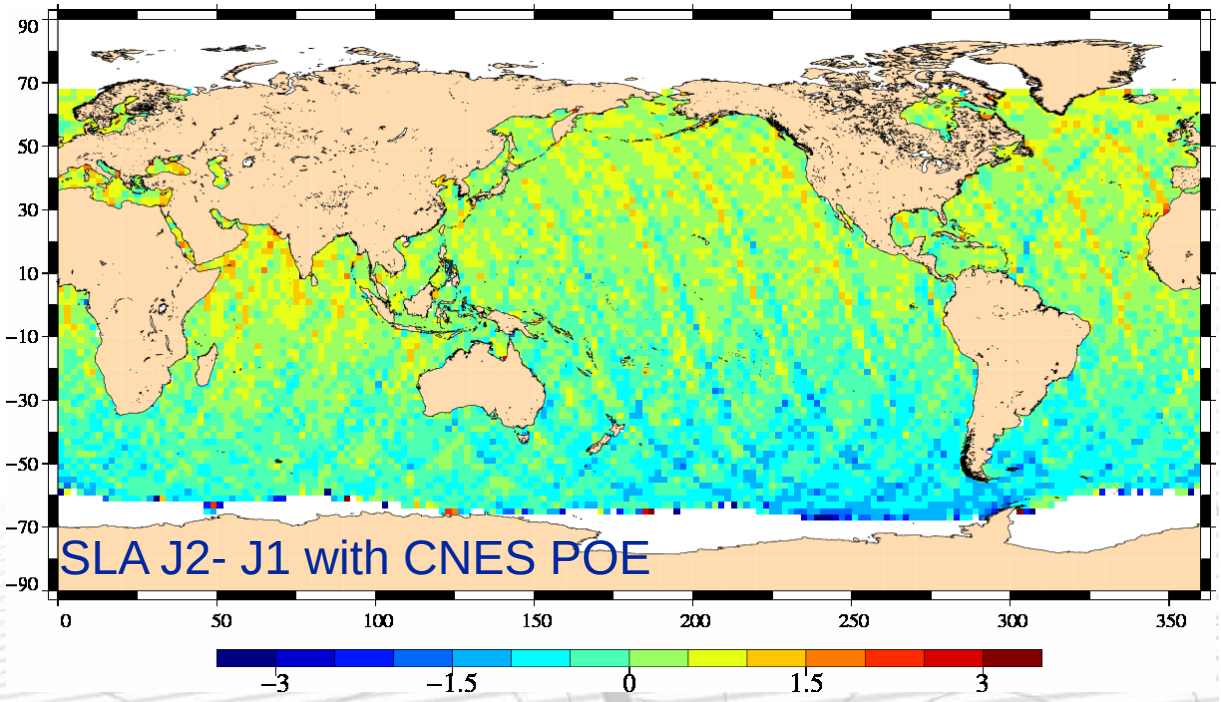
SLA consistency between Jason-1 and Jason-2

- Map of mean of J2 – J1 SLA differences performed over all the period
  - ⇒From cycles 1 to 10 with IGDRs (MOE)
  - ⇒From cycles 1 to 7 using GDRs for Jason-1 and preliminary POE CNES for Jason-2

- Using CNES POE orbit, Jason-1/Jason-2 SLA consistency is improved.

- However, weak hemispheric differences remain close to 1 cm

- Correlated geographically biases are stable in space and time.



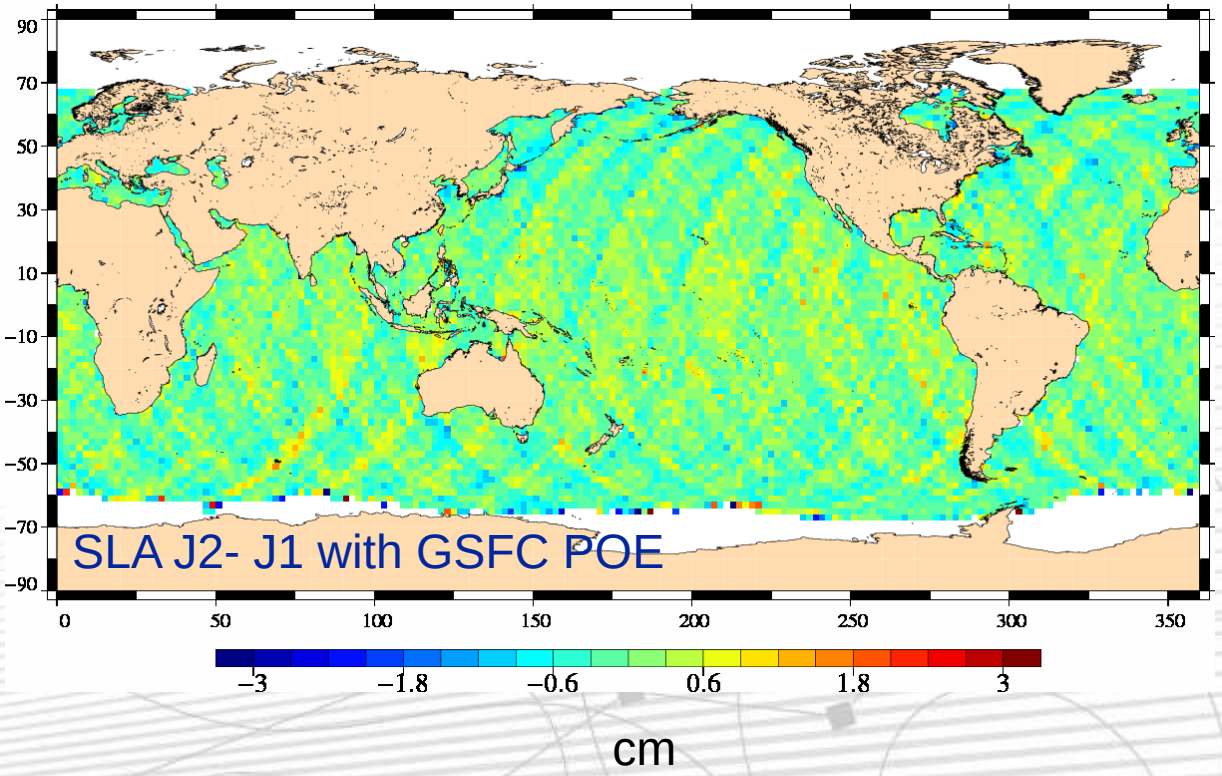
SLA J2- J1 with CNES POE

SLA consistency between Jason-1 and Jason-2

- Map of mean of J2 – J1 SLA differences performed over all the period
  - ⇒From cycles 1 to 10 with IGDRs (MOE)
  - ⇒From cycles 1 to 7 using GDRs for Jason-1 and preliminary POE CNES for Jason-2
  - ⇒From cycles 1 to 7 using POE GSFC for Jason-2 and Jason-1

- Using GSFC POE orbit, the hemispheric signal between Jason-1/Jason-2 is removed, no abnormal feature is observed.

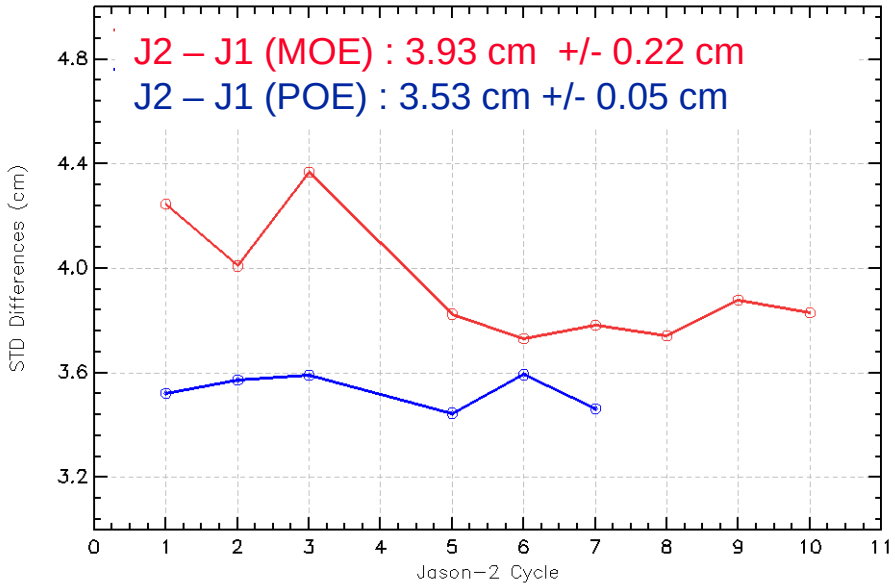
- SLA differences are lower than 0.5 cm



SLA J2- J1 with GSFC POE

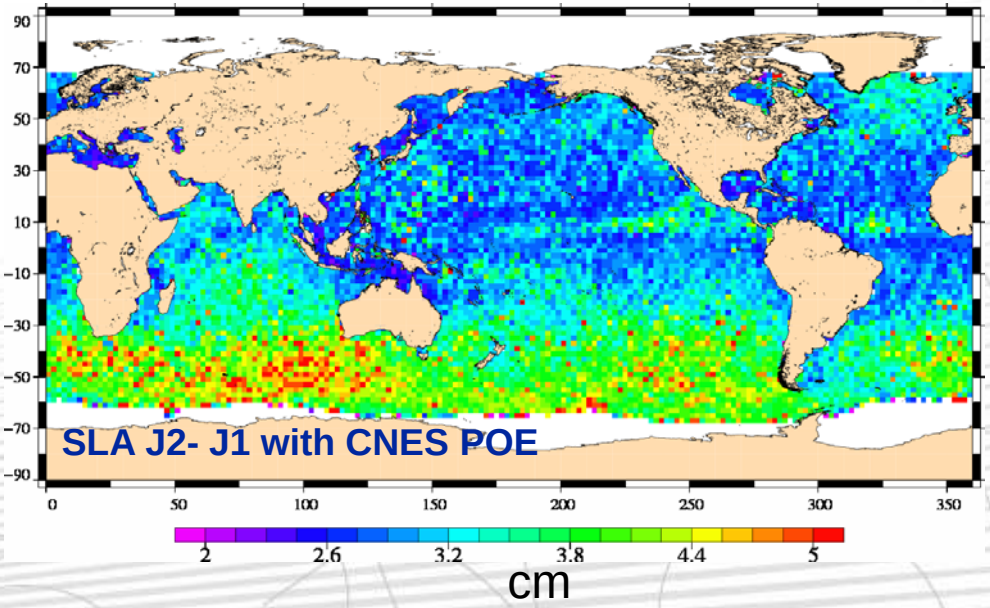
STD of SLA differences

- The global standard deviation of SLA differences is very stable and weak



- The standard deviation map of SLA differences depending on the SWH as expected

- No abnormal feature is highlighted showing the good consistency of both SLA.



Summary of along-track SLA analyses

- The SLA consistency between both missions is already very good just 4 months after the launch.

- The weak remaining differences observed between both SLA are mainly due to the orbit calculation :

$\Rightarrow$ Using POE GFSC orbit for J1 and J2 , differences are lower than 0.5 cm demonstrating there is no significant correlated geographically biases due to altimeter range between Jason-1 and Jason-2.

Conclusion

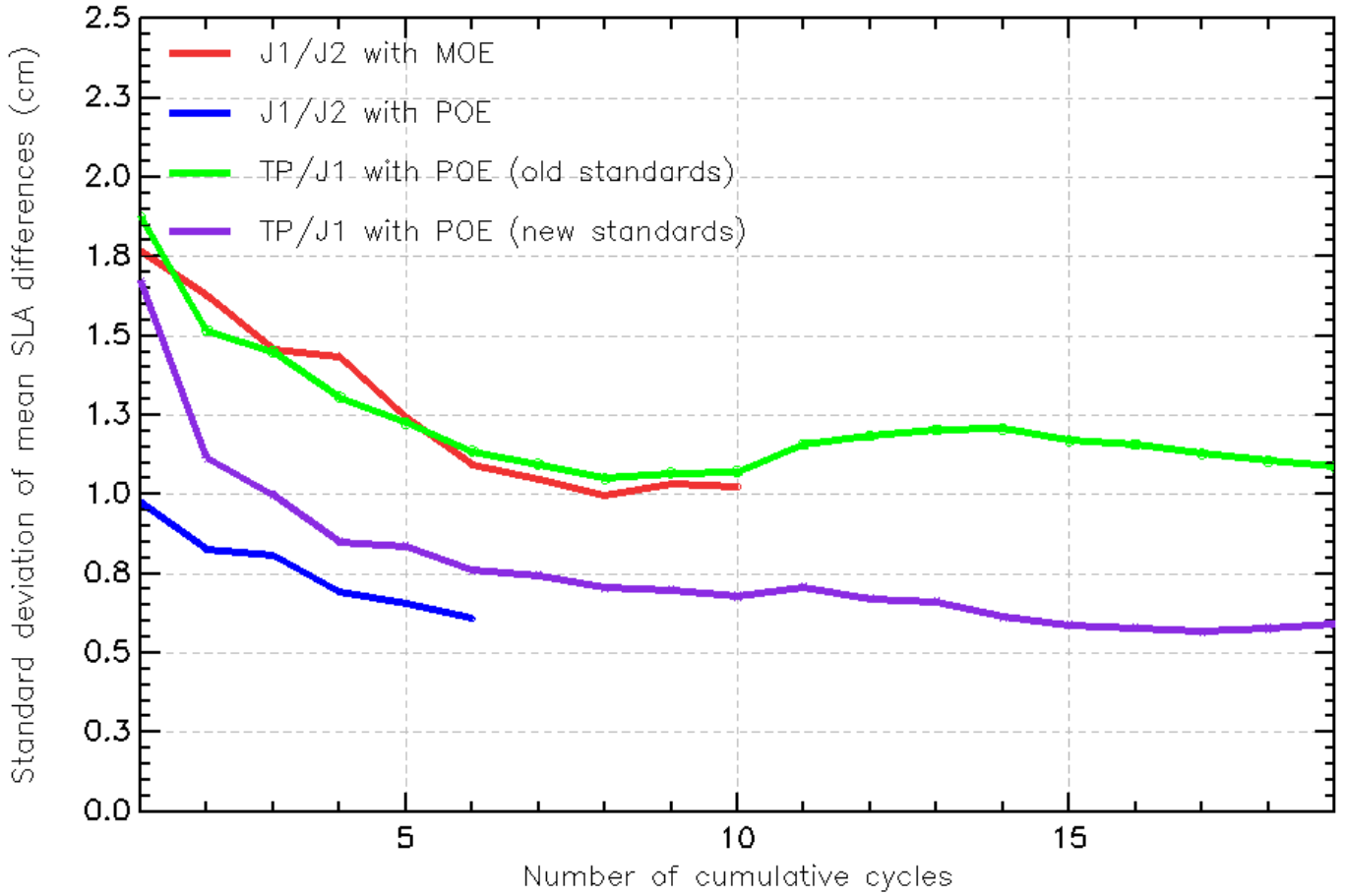
- Parameter and SLA performances and consistency is very good between Jason-1 and Jason-2:

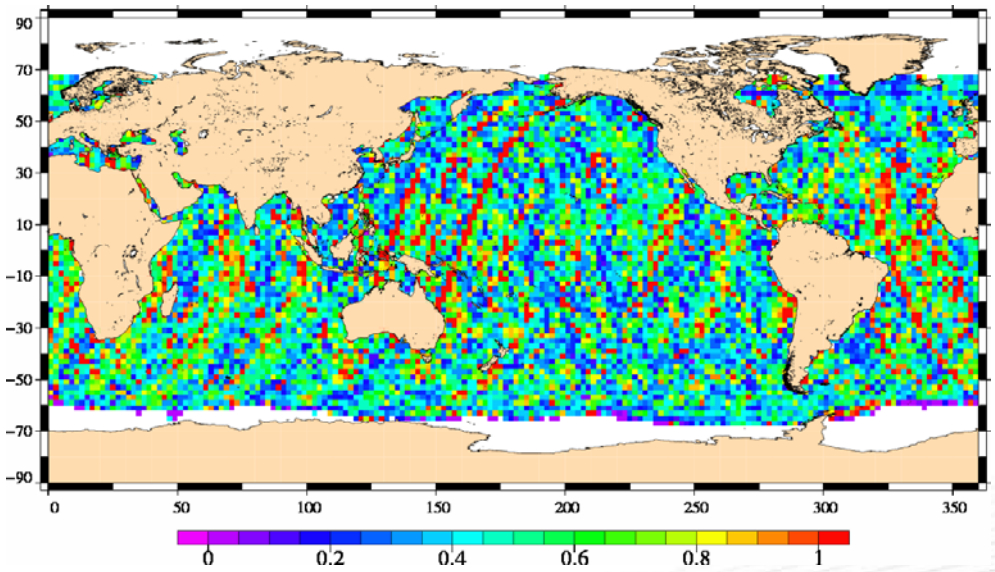
  ⇒In comparison, J1/J2 SLA consistency using POE from 6 cycles is comparable to the SLA consistency between Jason-1 and T/P during all the verification phase (21 cycles), using new orbit standards and similar retracking.

  ⇒ The very stable SSH bias between J2 and J1 (<0.2 cm RMS) allows us to link both MSL series very accurately.

- Additional Jason-2 cycles will not be useful to better analyze the Jason-2 SSH performances and the SLA consistency with Jason-1. From this Cal/Val point of view, and in order to better benefit from these both missions for scientific applications, Jason-1 satellite can then be moved to its new interleaved orbit as soon as possible.

M


J1/J2 with MOE
J1/J2 with POE
TP/J1 with POE (old standards)
TP/J1 with POE (new standards)
Standard deviation of mean SLA differences (cm)
2.5
2.3
2.0
1.8
1.5
1.3
1.0
0.8
0.5
0.3
0.0
5
10
15
Number of cumulative cycles


90
70
50
30
10
−10
−30
−50
−70
−90
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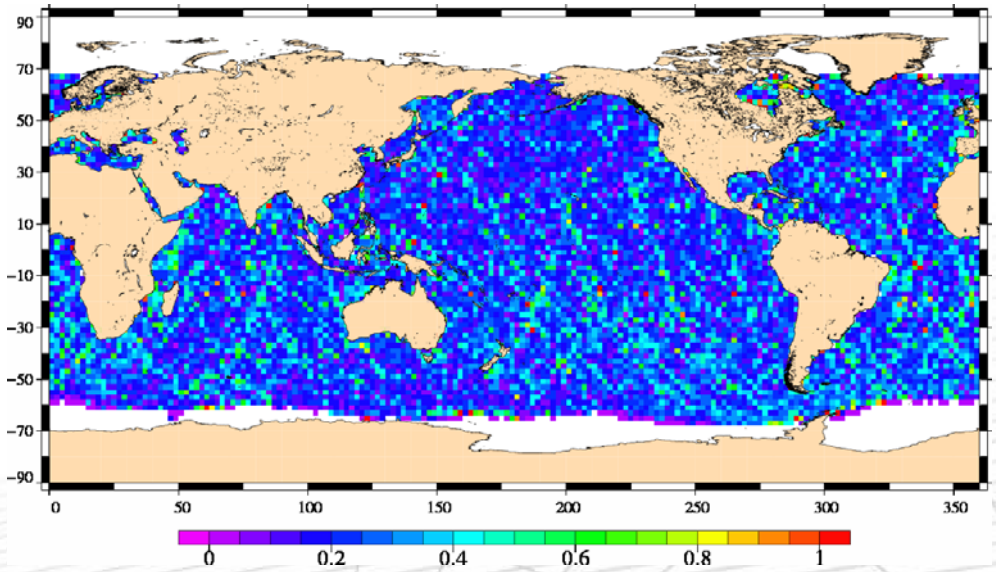
50
100
150
200
250
300
350
0
0.2
0.4
0.6
0.8
1


90
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0
0.2
0.4
0.6
0.8
1