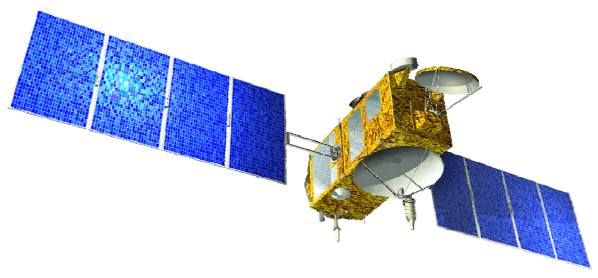
(B) GLOBAL Statistical Jason-2 assessment and cross-calibration with Jason-1
SLA Performances and Consistency



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Overview

This study aims at presenting the Jason-2 (JA2) and Jason-1 (JA1) SLA performances and consistency. Analysis are concentrated on first 20 cycles, when JA1 and JA2 were on the same orbit, only 55 seconds apart. On the one hand, SSH crossovers analyses provide the global performances of the Jason-2 system using IGDR and GDR products. Performances with similar Jason-1 statistics are compared. On the other hand, along-track analyses allow us to check the SLA consistency between both missions. Peculiar attention is paid on the global SSH bias and correlated geographically SSH bias using MOE and POE orbits.

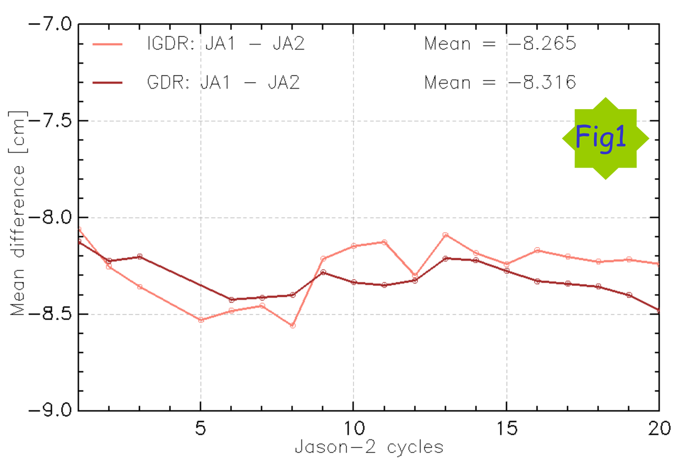
Data used for Jason-1 and Jason-2		
Products	Jason-1	Jason-2
IGDRs	Cycles 240 to 259/267/272	Cycles 1 to 20/28/33
GDRs	Cycles 240 to 259/267	Cycles 1 to 20/28

Along track SLA analyses

Cycle by Cycle monitoring

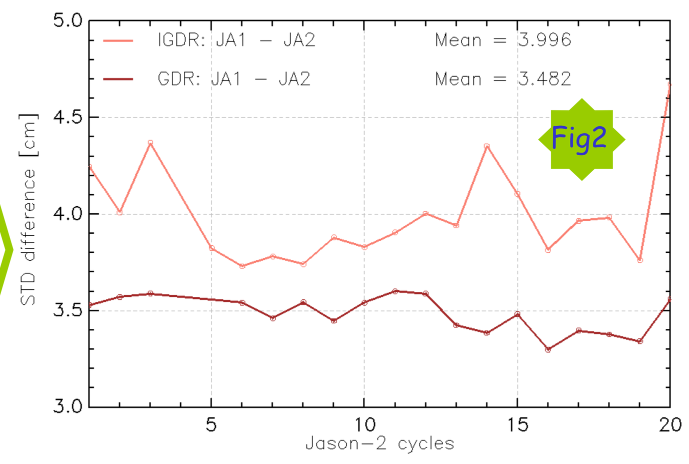
The global SSH bias between Jason-1 minus Jason-2 is -8.3 +/- 0.2 cm using MOE or POE orbits for both satellites (Fig. 1), and without using any correction in SSH calculation. It is very stable with weak variations around 0.2 cm. Applying all the usual correction (not shown here), the bias is reduced close to -7.5 cm, mainly due to the altimeter ionospheric bias between Jason-1 and Jason-2.

The standard deviation of global SLA differences is also very stable and weak over all the Jason-2 period (fig.2) with figures close to 4.0 cm RMS using MOE orbits and 3.5 cm RMS using POE orbits.



Mean of J2/J1 SLA differences (cm)

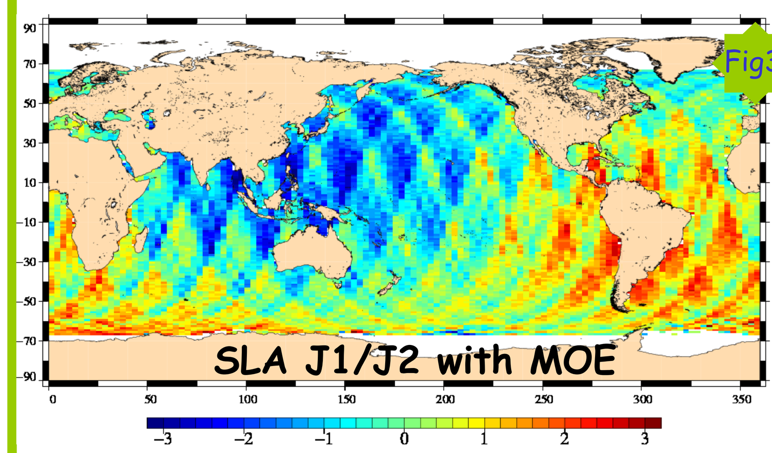
Impact of MOE and POE orbits for J1 and J2



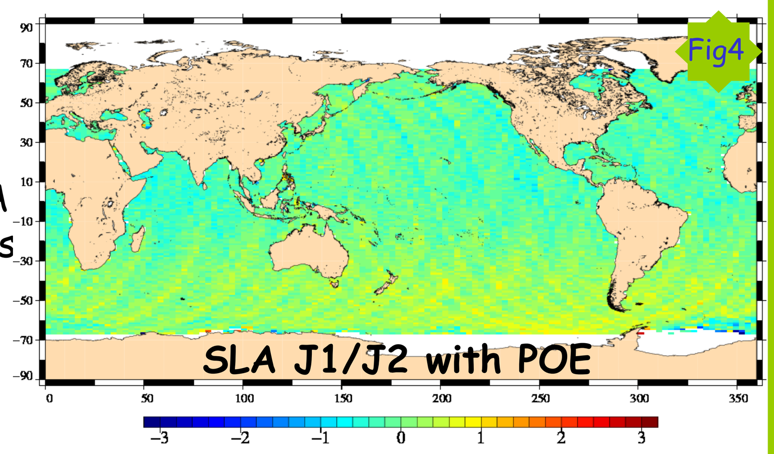
Standard deviation of J2/J1 SLA differences (cm)

Spatial Analyses

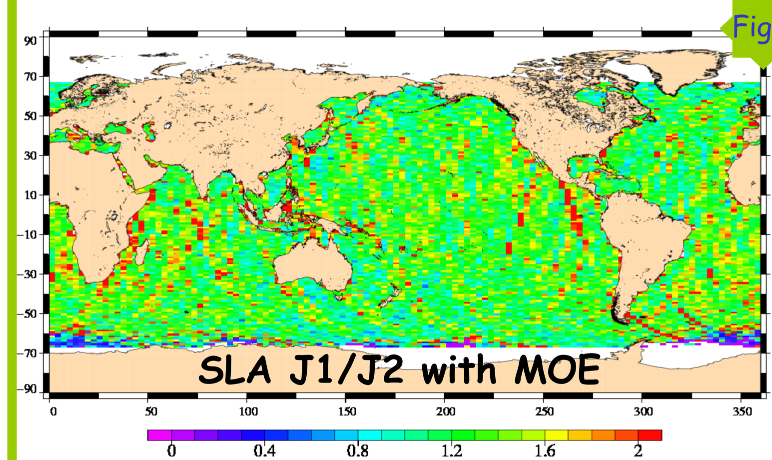
The map of mean of Jason-1/Jason-2 SLA differences over cycles 1 to 20 from IGDR products highlight correlated geographical biases as plotted in figure 3, ranging between +/- 3 cm. As expected, these patches are almost completely removed using POE orbits (fig. 4), showing the very good consistency between both missions. However, very weak hemispheric structures remain with an amplitude close to 1 cm (fig. 8). They are very likely related to the orbit calculation. In addition, the structures observed using MOE orbit vary in space and in amplitude from one cycle to another as shown by the analyze of the temporal variability of the SLA differences (fig. 5). Using POE orbit, these variations are significantly reduced (fig. 6).



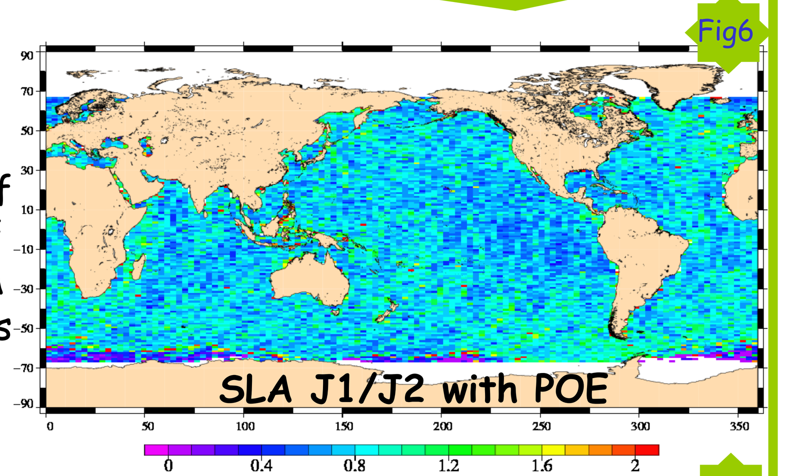
Mean of J1/J2 SLA differences (cm)



Impact of Jason-1 and Jason-2 POE orbits

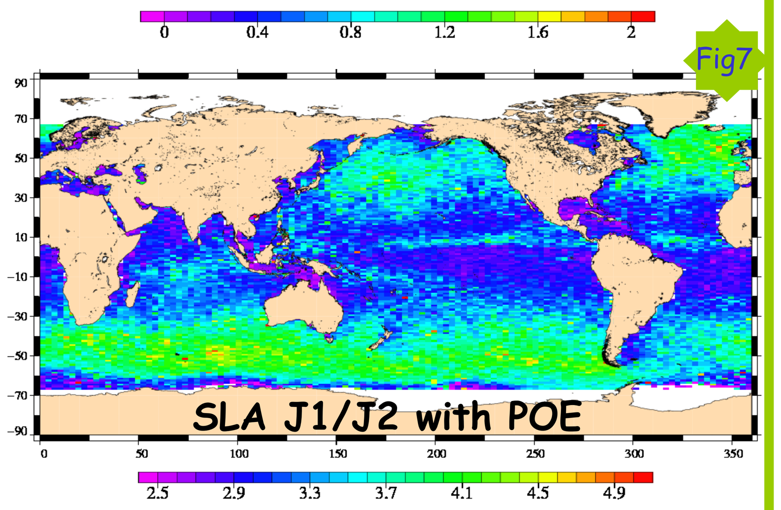


Temporal standard deviation of of mean of J1/J2 SLA differences (cm)



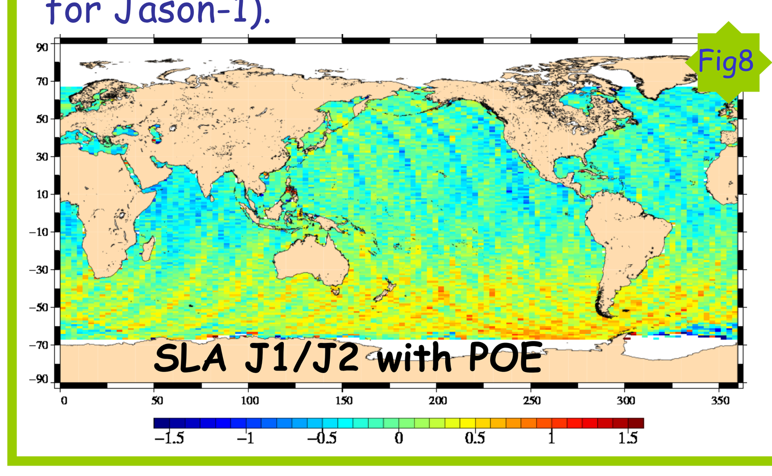
The standard deviation of SLA difference is, as expected, mainly depending on the SWH (fig. 7). This is explained by the 1-Hz SSH noise higher in strong SWH area due the ground processing. No abnormal feature is highlighted, showing the good consistency of both SLA between 3 and 5 cm RMS.

Standard deviation of J1/J2 SLA differences (cm)

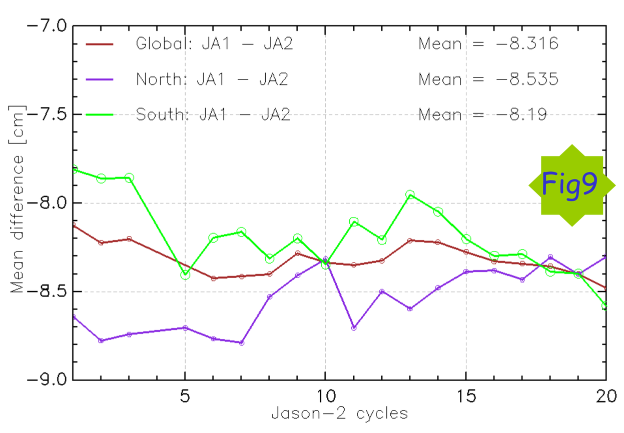


Small hemispheric bias between JA2 and JA1 GDR

POE of JA1 and JA2 are in good agreement, there is however a small hemispheric bias (+/- 1cm) in the map of JA1 – JA2 SLA differences (fig. 8). This bias is also visible on cyclic monitoring separated for hemispheres (fig. 9). This bias, relatively strong during first cycles, varies with time. It is probably caused by differences in orbit solutions (no more GPS data for Jason-1).



Map (fig. 8) and monitoring (fig. 9) showing Mean of J1/J2 SLA differences (cm)

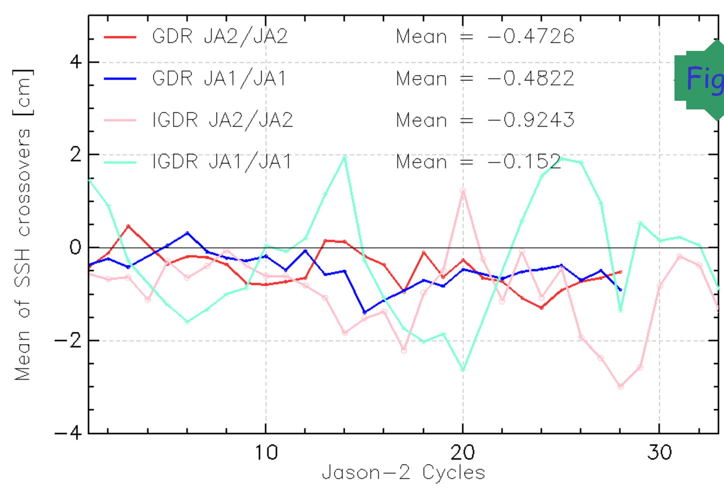


SSH Crossovers analyses

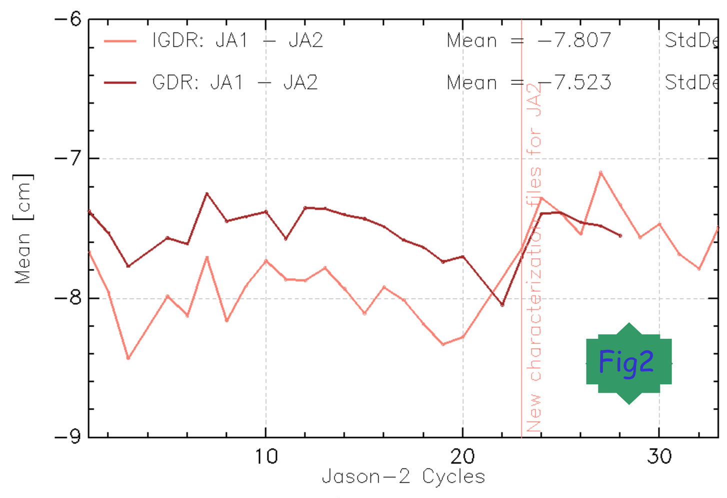
Cycle by Cycle monitoring

The monitoring of Jason-2 (corrected) SSH statistics at crossovers are very good. A slight improvement is observed using Jason-2 IGDRs in comparison with Jason-1 : SSH crossover mean is equivalent (fig 1), but SSH crossover standard deviation is reduced (5.4 cm RMS for JA2 instead of 5.5 cm RMS for JA1 (fig.3)). Nevertheless, standard deviation of Jason-2 seems to show an increasing trend. Results for GDR products are equivalent for Jason-2 and Jason-1 with SSH crossover mean more homogeneous than for IGDR and standard deviation close to 5.0cm.

Concerning multi-mission SSH crossovers (JA1 – JA2), coherence between the two missions is improved for GDR (5.1 cm) versus IGDR (5.6 cm) (fig. 4). Note that mean of IGDR SSH crossovers displays a jump at cycle 23, due to new AMR characterization files (see poster A).

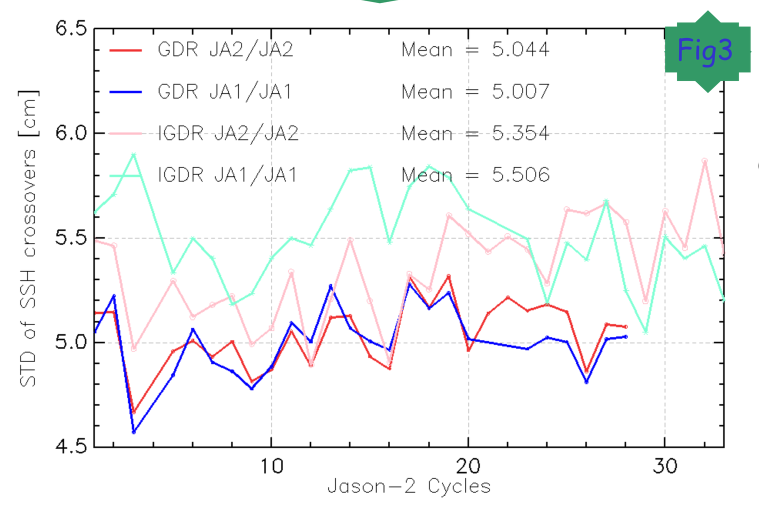


Mean of SSH crossovers (cm)

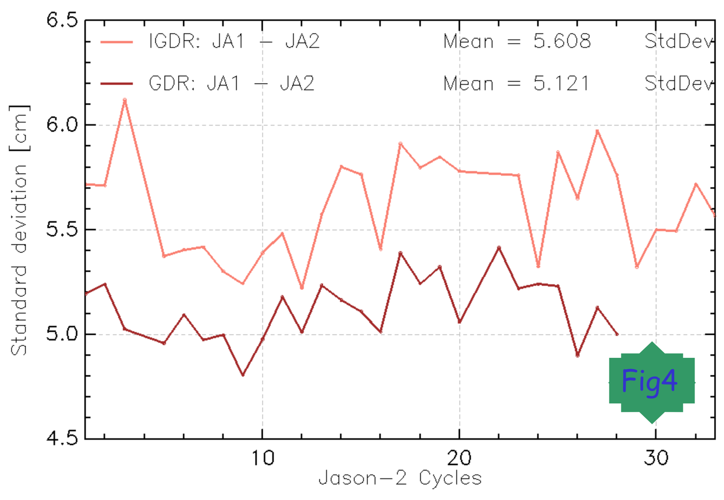


Impact of MOE and POE orbits for J1 and J2 (Mono-mission)

Impact of MOE and POE orbits for J1 and J2 (Multi-mission)

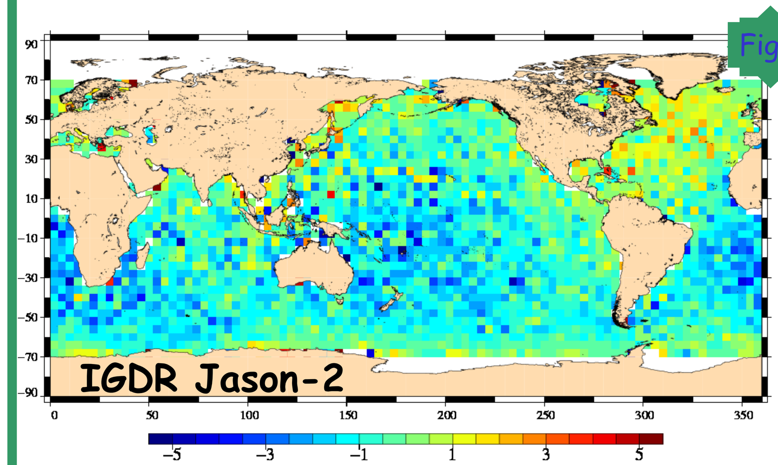


Standard deviation of SSH crossovers (cm)

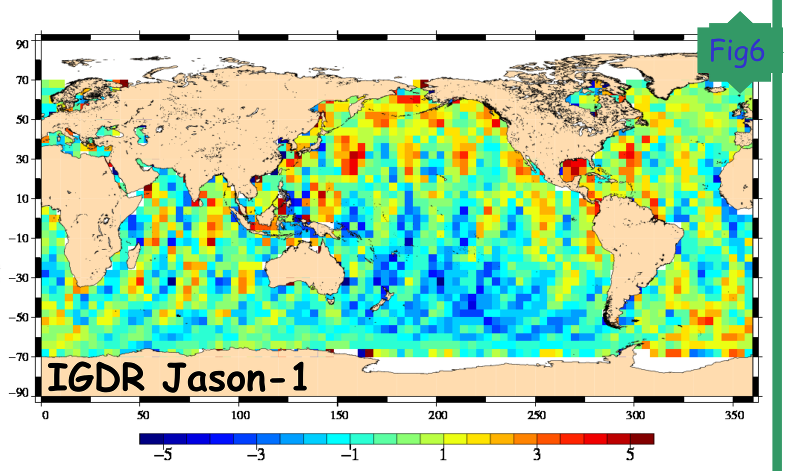


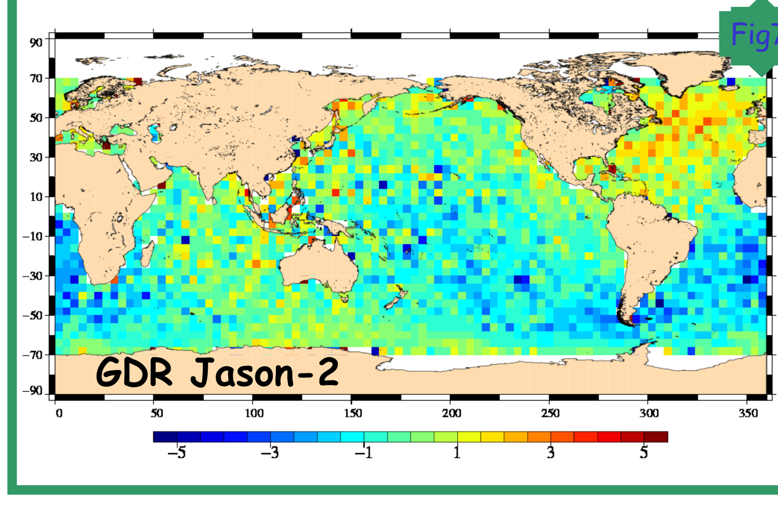
Spatial Analyses over all the period

The map (over cycles 1 to 28) of SSH crossovers mean is more homogeneous for Jason-2 (fig. 5) than for Jason-1 (fig.6) using IGDR products. Concerning GDR products, maps of SSH crossovers mean are very similar for both Jason-2 and Jason-1 (fig. 7 and 8), with a weak geographical pattern in North Atlantic. These items bring out the very good quality of Jason-2 SSH for both GDR and IGDR products, as well as the good consistency between POE of Jason-1 and Jason-2.

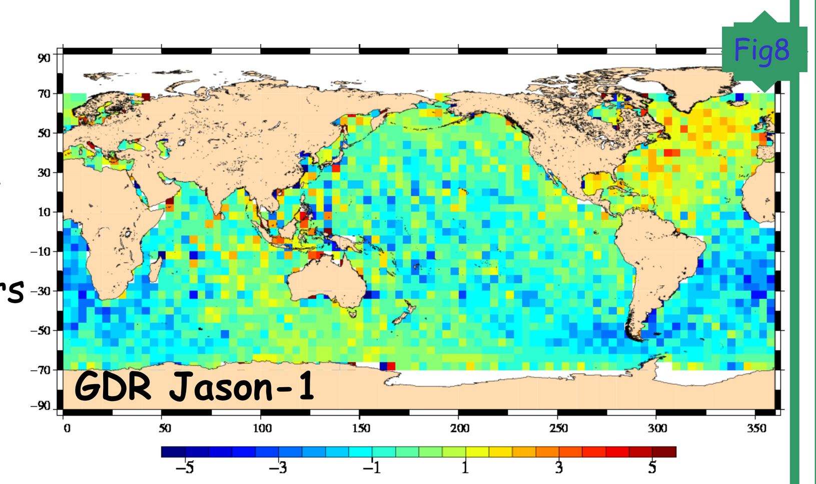


IGDR Mean of SSH crossovers (cm)





GDR Mean of SSH crossovers (cm)



Conclusion

In this study, we show the good performances of Jason-2 SSH in the same order (GDR) or better (IGDR) than Jason-1 ones. In addition, the SLA consistency between both missions is very good. The weak remaining SLA differences observed by hemisphere using the POE orbits (around 1 cm) are likely due to the orbit calculation differences between both missions. The ageing of Jason-1 (no more GPS data) explains very likely these differences.

The excellent data quality of Jason-2 allows to continue studies of Mean Sea Level evolution and assures a seamless transition with Jason-1 data.

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