(2) # SSALTO/CALVAL Jason-1 activities – Particular investigations

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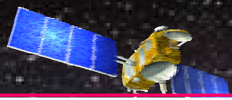
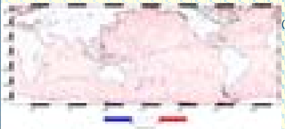
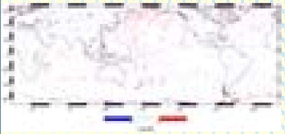


Impact of Version CMA 6.0 changes

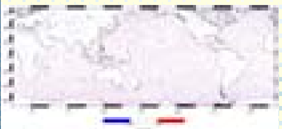
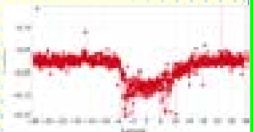
The updates from V5 to V6 analyzed below are:
- The initialization of the retracking algorithm with the On-board mispointing.
- The use of the MQE (Mean Quadratic Error), estimated between the real waveform and the associated fitted model, to edit the data against thresholds.
- The change in the Range compression algorithm (from 20Hz to 1Hz)


Squared mispointing (deduced from waveforms)



(Sigma0 V6– Sigma0 V5)



(SWH V6 – SWH V5)



Range V6– RangeV5


The Sigma0 and SWH maps both show the impact of taking into account the on-board mispointing in input of the retracking algorithm. The two maps also show the effect of the MQE editing: impact in the equatorial area were the waveforms are corrupted by rain cells.
The Range map shows the effect of the three changes.

Jason-1 / TOPEX performance investigations

Jason-1 and T/P performances are similar. However T/P figures are slightly lower than Jason ones. In order to better understand this difference, the SSH-MSS differences have been filtered along-track (low pass filter) for both satellites. The short and long wavelength contents have been separated and analyzed at crossovers and at collinear differences.

Crossover analysis

Low Pass filter applied with a 50 km cut-off wavelength :

1) Crossover differences of the short wavelength signal (a) show the impact of the different ground processing between TOPEX and Jason-1 (Zanife et al, 2003). Jason-1 standard deviation is about 1.9 cm RMS higher than TOPEX. Note that Poseidon and Jason-1 performances (cycle 18) are the same.

2) Long wavelengths (b) mainly show the impact of orbit errors on both missions (among other possible errors). Jason-1 POE orbit has not been reprocessed on early cycles and seems degraded. But from cycle 8 onwards, the performances are more similar.

a) Crossover differences short wavelengths (<50 km)


b) Crossover differences long wavelengths (> 50 km)


SLA variability

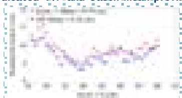
a) Long wavelengths (> 500 km)


b) Medium wavelengths (50km<λ<500 km)

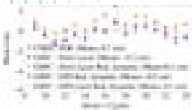

c) Short wavelengths (< 50km)


As in the crossover analysis, short and long wavelength contents of SLA (with wavelength respectively lower than 50 km and greater than 500 km) mainly show the effect of the ground processing (c) and the orbit quality (b).

Medium and short wavelengths show a degradation of TOPEX performance after the orbit change due to use of a MSS to compute SLA. Indeed the MSS adds errors at these wavelengths, when used outside the nominal T/P – Jason ground track.
To remove the effect of the MSS, SLA are then computed relative to dedicated mean profiles for Jason-1 and TOPEX (cycles 26-60). Consistent computation of figure (d) proves the impact of the MSS on figures (b) and (c).

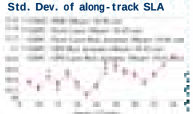
d) Repeat-track analysis with Dedicated T/P and Jason mean profiles


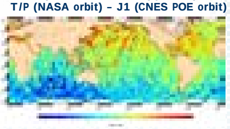
Impact of orbit calculation

SSH crossover mean


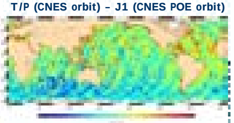
In order to assess the POE CNES orbit quality in Jason-1 GDRs , several GSFC orbits have been tested.
In terms of variance, the results are very close. However, using the GSFC GPS-Laser red. dyn. orbit instead of POE CNES reduces the crossover standard deviation by about 1 cm RMS.

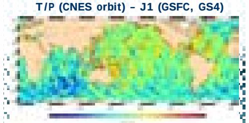
SSH crossover standard deviation


Std. Dev. of along-track SLA


a) SSH differences (cycle 13) T/P (NASA orbit) – J1 (CNES POE orbit)


Geographical features (a) are observed on SSH differences between TOPEX (NASA orbit) and Jason-1 (POE orbit). These features are reduced when the CNES orbit is used for TOPEX (b). Similar results are obtained with the Jason-1 GPS-Laser (red. Dyn.) GSFC orbit instead of CNES orbit (c), with slightly lower trackiness.

b) SSH differences (cycle 13) T/P (CNES orbit) – J1 (CNES POE orbit)


c) SSH differences (cycle 13) T/P (CNES orbit) – J1 (GSFC, GS4)


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Jason-1 Science Working Team Meeting

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