(1) SSALTO/CALVAL Jason-1 Performance assessment
Jason-1 / TOPEX/Poseidon cross-calibration

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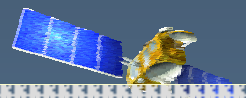


OBJECTIVES

Quality assessment of Jason-1 data

Continuous monitoring of altimeter, radiometer parameters and geophysical corrections

Assessment of Jason-1 performances and improvements

Jason-1 / TOPEX/Poseidon cross-calibration

PROCESSING & TOOLS

SSALTO/CALVAL activities and studies are routinely performed to assess the Jason-1 GDR data quality using various processing tools:

- Missing measurements, data coverage, data editing
- Crossover analysis (performances evaluation, SSB, time tag bias, orbit error)
- Repeat-track analysis (statistical monitoring, biases and drift determination)
- Spectral analysis, Iodeh signal evaluation

Quality assessment reports are produced on a one cycle basis and associated to the GDR dissemination.

GDR UPDATE

In order to compare the Jason-1 and T/P performances and to perform the cross-calibration between the two types of data, both GDRs have been updated as follows:

Jason-1 GDR updates: ECMWF model derived wet troposphere correction (rectangular grids)

T/P GDR updates: Jason-1 geophysical corrections (Got99 tide, Inverse Barometer, polar tide), TOPEX non-parametric SSB (Gaspar et al.)

Jason-1 Performance Assessment

Crossover analysis

Jason-1 crossover variance (DT<10 days) seems comparable to that of T/P (same period). However, higher values are found for Jason-1. The two main sources of differences seem to be:

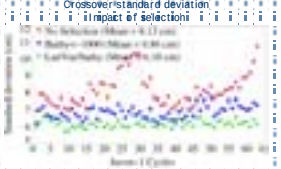
1) 1 Hz High Frequency content

Jason-1 data are retracked data, unlike T/P ones. Consequently, the correlation of 20Hz and 1Hz data is lower for Jason-1 than for T/P (Zanife et al, 2003). See SSH performance comparisons in poster (2).

2) Orbit performances

To a lesser extent, some part of the differences may be due the orbit quality. Even well performing, the Jason-1 orbit might be slightly degraded relative to the T/P one on some cycles (see also poster (2)).

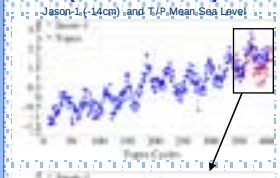
Crossover standard deviation
(Impact of selection)

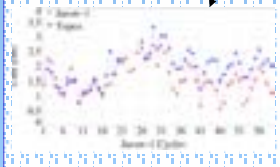


Crossover standard deviation
Comparison to T/P (same crossovers)

SLA along-track analysis
(SSH - CLS01 MSS)

Jason-1 (-14cm) and T/P Mean Sea Level



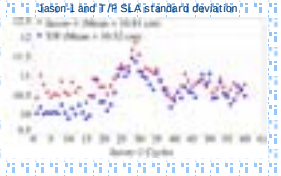


The cycle by cycle mean sea level of Jason-1 and T/P are consistent over cycles 1-25. Over cycles 26-60 the 2 signals diverge due to the JMR wet troposphere correction.

The SLA standard deviation exhibits good performances for both satellites. However, during the tandem period, the variability is slightly higher for Jason-1 (same reasons as for the crossover analysis). During the interlaced period, T/P variability is higher because of the lower accuracy of the MSS on the new ground track.

The 2002-2003 El Nino is observed from cycle 20 to 40.

Jason-1 and T/P SLA standard deviation



Jason-1 / TOPEX/Poseidon Cross-calibration

Altimeter parameter

Two methods are used to compute statistics on SWH, Sigma0 and ionosphere correction differences:

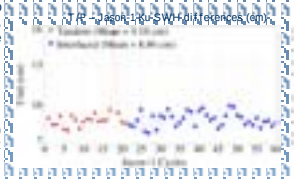
Cycles 1 to 21:
Cycle mean of (TP-J1) repeat track differences

Cycles 22 to 60:
Cycle 1 mean of (TP-J1) differences using a nearest point determination method.

The Jason-1 and T/P altimeter parameters are consistent.

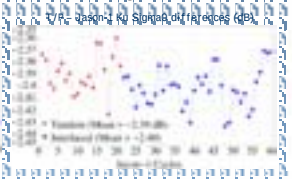
SWH

T/P - Jason-1 SWH differences (cm)



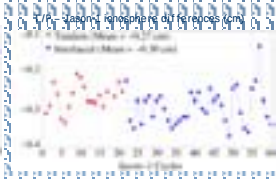
Sigma0

T/P - Jason-1 Ku Sigma0 differences (dB)



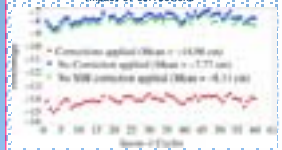
Ionosphere correction

T/P - Jason-1 ionosphere differences (cm)

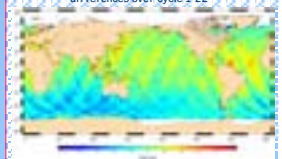


SSH cross-calibration

(T/P - Jason-1) Mean SSH differences
Impact of corrections



Mean of (T/P - Jason-1) SSH differences over cycle 1-22



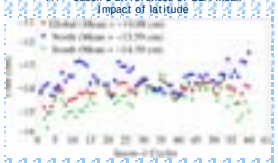
These results are obtained using the same ECMWF wet troposphere correction (to avoid any JMR correction impact).

The cycle by cycle (T/P - Jason-1) Mean SSH differences (left) show that the global bias between the 2 satellites is quite stable, about -14 cm.

The map shows the (T/P - Jason-1) SSH differences averaged over the tandem mission (21 cycles). These differences seem geographically correlated.
This is confirmed by separating Northern and Southern hemispheres. The North/South signal depends on the cycle number, but keeps the same sign.

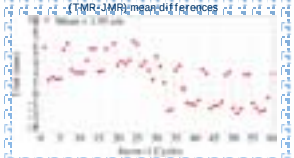
See also the performance investigations in poster (2).

T/P - Jason-1 differences of SLA Mean
Impact of latitude

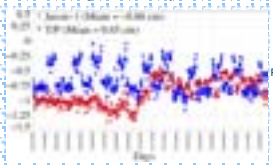


JMR / TMR comparisons

(TMR-JMR) mean differences



Both cross-calibration and radiometer long term monitoring allowed to detect changes in the JMR correction.
The 2 plots point out a strong change (-5 mm) in the JMR wet troposphere correction over cycles 28-31.
Comparisons to the ECWMF correction (bottom plot) show some JMR signal linked to yaw mode transitions.



Radiometer - ECMWF wet corrections

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Jason-1 Science Working Team Meeting

Arles, November 2003

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