TOPEX/POSEIDON data are routinely analyzed at CLS using tools developed as part of the CNES AVISO/CALVAL project.
This allows:
- altimeter performance monitoring
- testing new algorithms in terms of improvement of T/P data quality and precision.

AVISO/CALVAL activities

TOPEX/POSEIDON performance monitoring
Evaluation of new algorithms

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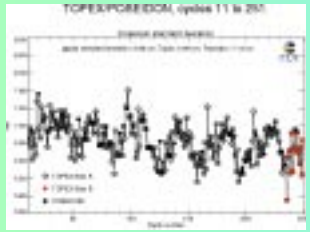
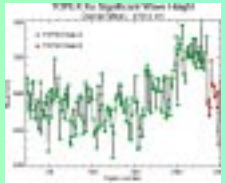
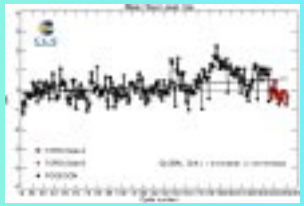
TOPEX/POSEIDON performance monitoring

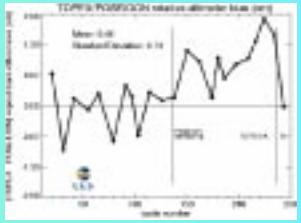
Though not sensible for most applications, a low degradation of TOPEX altimeter measurement has been detected, caused by PTR changes. Extrapolations (Haynes et al. 1998) showed that the signal would become unrecoverable by the mid of 1999. It was thus decided to switch on the Side-B TOPEX altimeter.



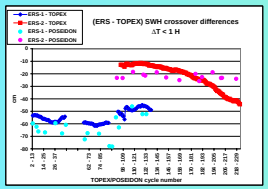


This added a new calibration task to the routinely processed AVISO/CALVAL analyses.
The performances of the 3 types of altimeter measurements (TOPEX Side-A, B, and Poseidon) are consistent in terms of crossover variance (upper left figure). The decreasing trend is probably due to orbit improvements.
The MSL estimations (upper right figure) show a 1 cm bias between Side-B and last Side-A estimates. But last Alt-A cycles may be corrupted by the SWH increase via the SSB correction: the lower left figure shows the trend in Alt-A SWH estimations caused by the PTR change. Alt-B has recovered "nominal" values.
MSL estimations are now more consistent with the first years of Alt-A, but also with Poseidon, as shown by the TOPEX/Poseidon relative bias on the lower right figure.

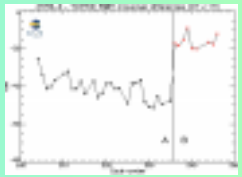




Comparison to external data sources

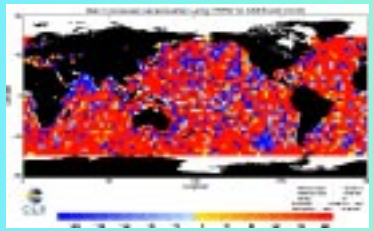


Intercalibration of T/P data with ERS-2 is performed under ESA contract. It allows detection of possible drifts of one system relative to the other, for both altimeter and radiometer parameters. For instance, the TOPEX Alt-A SWH drift has been clearly evidenced by the comparison at dual crossovers (time lag < 1 hour).
This method has also been used during the calibration of the Side-B TOPEX altimeter. It will take on added importance for follow-on altimetry missions.

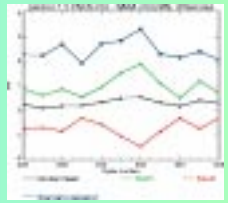


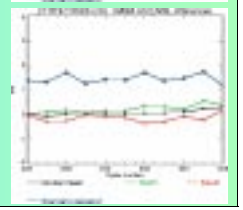
In order to better understand the physical content of SSH variations deduced from T/P measurements, comparisons have been performed with Sea Surface Temperature (Reynolds). From the global mean variations of both SSH and SST, one can deduce the correlation between the two kinds of data. Comparable rise and fall are observed during the 1997-1998 El Niño event. The MSL rise in the last Alt-A cycles (just after El Niño) can probably be attributed to the altimeter degradation, since such a rise is not present in the Mean SST.

ITRF97 set of coordinates for CNES orbit



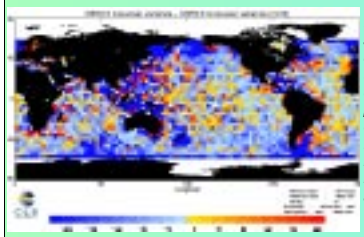
The ITRF97 set of station coordinates has been implemented in the CNES operational orbit computation at cycle 247. Cycles 236 to 246 have been reprocessed, allowing comparisons with former processing. In fact, different station coordinates for CNES and NASA orbits had been suspected to be responsible of the main differences.



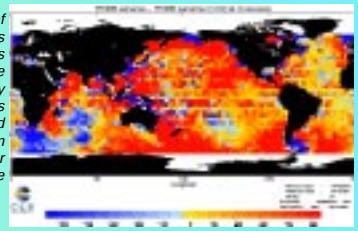


The gain in crossover variance when using ITRF97 set of coordinates is globally about 3 cm^2. The variance is reduced in almost all areas (left figure). Now, Over cycles 236 to 246, it only differs by about 0.5 cm^2 from NASA crossover variance.
Furthermore, MSL estimations are now much more consistent (right figure). Discrepancies at hemispheric scale have largely been removed and the (CNES-NASA) orbit differences are reduced to about 1 cm rms.

Tidal models evaluation

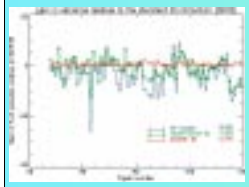


In the frame of JASON-1 algorithms definition, various tide models are to be evaluated. Only preliminary results on CSR4.0 and FES98 are shown here, but other models will be analyzed too.



Left figure shows that less crossover variance (over more than 6 years of data) is obtained when using CSR4.0 instead of CSR3.0, in all ocean basins. The variance reduction is globally about 2 cm^2.
The first version of FES98 model has also been tested, with no altimetric data assimilated in this version. As expected, compared to FES95.2, results are degraded in open ocean. But significant improvements are noticed in areas where tides are poorly estimated. After altimetric data assimilation and with appropriate loading effect (CSR3.0 model is used in this test), these promising results should be improved.

Towards new Inverse Barometer corrections?



This preliminary study has been carried out jointly with Rui Ponte (A.E.R). It aims at demonstrating the feasibility of computing an inverse barometer correction from barotropic model outputs (Rui Ponte), in an operational scheme.
In this test, NCEP reanalyzed pressure fields have been used to force the model. When compared to pure IB corrections, the model does not improve the T/P crossover variance (left figure). But it shows some skill in the Southern Ocean.
More work will now be done to improve the results.