Mean Sea Level monitoring and altimeter intercalibration

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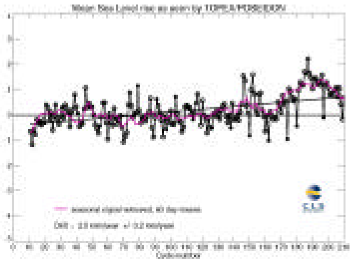
INTRODUCTION

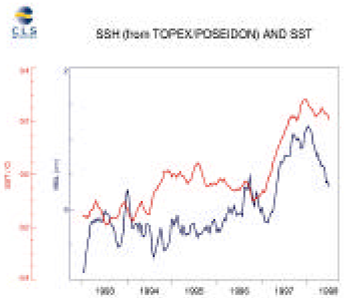
Monitoring Mean Sea Level variations at the 1mm/year level is one of the major objectives of present and future altimetric missions. To reach this goal, long-term Mean Sea Level rise has to be distinguished from geophysical effects (e.g. El Niño event) as well as from possible processing or instrumental errors.
As part of the AVISO/CALVAL activities (supported by CNES) and TOPEX/POSEIDON – ERS inter-calibration (supported by ESA), results from Mean Sea Level and relevant parameters monitoring are presented. The comparison between different altimeters provides means to detect instrumental drifts, system changes or processing errors.

MEAN SEA LEVEL MONITORING

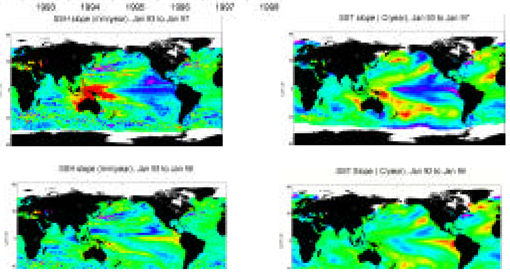
Cycle by cycle MSL estimations from repeat-track analysis are obtained for both TOPEX (circles) and POSEIDON (dots) altimeters. The relative bias between the two altimeters is about 1 cm after POSEIDON retracking (cycle 138).
Note the large MSL rise during El Niño event.



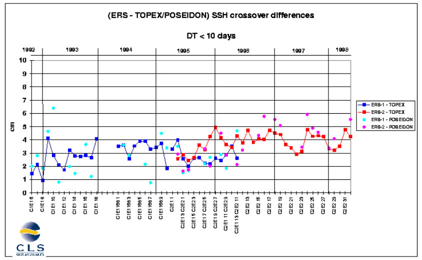
COMPARISON TO SEA SURFACE TEMPERATURE



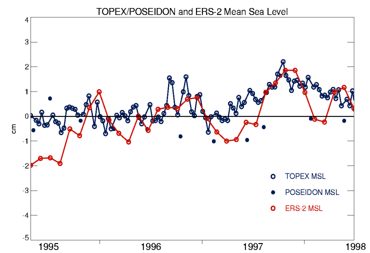
The global means of SSH (T/P) and SST (Reynolds data) after removal of seasonal variations are in good agreement (rise and fall) during the last El Niño.
This mean sea level rise (during the 97/98 El Niño) shows that long-term MSL monitoring might require longer time series.



T/P– ERS SSH INTERCALIBRATION



Comparison of SSH at dual crossovers will be useful for future missions (e.g. JASON and ENVISAT).
The method is routinely applied to T/P and ERS, after updating ERS data for corrections and software versions (Stum et al., 1998). It allows a detection of biases and drifts of ERS altimeters.



The comparison of ERS-2 and T/P MSL results shows the lower level of accuracy of ERS-2 data. The variations as a function of time of ERS-2 –T/P crossover differences and absolute ERS-2 MSL estimations are almost the same, and are due to ERS-2 range jumps.

TMR/MWR INTERCALIBRATION

The same exercise has been achieved at (TMR – MWR) crossover differences, with 1-hour time lag (Stum, 1998). The primary –1 mm/year drift could be attributed to T/P, since ERS-1 and ERS-2 results agree during the tandem phase. This drift might impact the T/P MSL rise of about 1 mm/year (rise underestimated).
Unfortunately, dramatic losses of accuracy of ERS-2 MWR