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Low-frequency sea level variability in the North Atlantic from TOPEX altimetry

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Satellite altimetry provides absolute sea level observations on a nearly global scale allowing the analysis of spatial patterns of sea level variability. The continuous series of altimetry measurements presently available allows the analysis of sea level variability on interannual / decadal time scales.

In this work, the low-frequency variability of sea level in the North Atlantic is analysed from TOPEX/Poseidon satellite altimetry data. A non-linear description of sea level low-frequency variability is considered. Over the North Atlantic the low-frequency components, derived from a wavelet-based multiresolution decomposition, display a generally increasing pattern. Furthermore, increase (decrease) of sea level at mid-latitudes is accompanied by a decrease (increase) of sea level in the northern and tropical North Atlantic.

The low-frequency pattern of sea level has been compared with the low-frequency components from sea surface temperature and atmospheric pressure data. Sea level and sea surface temperature exhibit a similar temporal evolution, particularly in the northern Atlantic and at mid-latitudes. The low-frequency series of sea level and sea surface temperature exhibit a positive correlation in the northern Atlantic and between 20-30 degrees North indicating a strong relationship between sea level and the thermal content of the upper ocean in these regions. The trend components of IB-corrected sea level and sea level pressure display a positive correlation near the equator.