



Recovery of sea level fields of the last decades from altimetry and tide gauge data

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Sea-level observations spanning several decades (tide gauge series) only cover the shores, while sea-level observations covering the whole ocean extension (altimetry series) only span the last decade and a half. We have reconstructed the monthly distribution of sea-level in the Mediterranean Sea and the north-eastern sector of the Atlantic Ocean from altimetry and tide gauge data for the period between 1969 and 2000. To carry out the reconstruction two methodologies have been used, both of them based on a principal component analysis. The first methodology consists of a principal component regression of the amplitudes obtained from satellite altimetry on the ones from tide gauges, while the second one substitutes the leading amplitudes obtained from altimetry by the ones from tide gauges in its singular value decomposition. In order to characterize the goodness of the reconstruction and the sensitivity of the methodology we have used two parameters: correlation and relative root mean square error of the time series predicted by the reconstruction and the values actually observed. Results show that the reconstruction carried out by the second methodology gives better results, moreover it's less sensitive to the number of tide gauges used for the analysis. The reconstruction is accurate along the whole north coast of the Mediterranean Sea and along the Iberian Peninsula coast, with correlations higher than 0.8 and relative root mean square errors lower than 0.45. The lowest correlations were found in the Algerian Basin, the Atlantic coast of Morocco and the south-eastern region of the Mediterranean Sea, which is related to the fact that most tide gauges are located in the northern region of the Mediterranean Sea.