Geophysical Research Abstracts,
Vol. 11, EGU2009-2844-1, 2009
EGU General Assembly 2009

Comparison of Mediterranean sea level fields for the period 1961-2000 as given by a data reconstruction and a 3D model

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Two Mediterranean sea level distributions spanning the last decades are examined. The first one is a reconstruction of sea level obtained by a reduced-space optimal interpolation applied to tide gauge and altimetry data. The second distribution is obtained from a 3D (baroclinic) regional circulation model. None of the two representations includes the mechanical atmospheric forcing. Results are presented for two different periods: 1993-2000 (for which altimetry data are available) and 1961-2000 (the maximum period common to both distributions).
The first period is examined as a test period for the model, since the reconstruction is very similar to altimetry observations. The modelled sea level is in fair agreement with the reconstruction and the observed trends in the Western Mediterranean and in the Aegean Sea (except in the early nineties), but in the Ionian Sea the model departs from observations. For the whole period 1961-2000 the main feature is a marked positive trend in the Ionian Sea (up to 1.8 mm/yr), observed both in the reconstruction and in the model. Also the distribution of positive trends in the Western Mediterranean (mean value of 1.1 mm/yr) and the smaller trends in the Aegean Sea (0.5 mm/yr) are similar in the reconstruction and the model, despite the first implicitly accounts for sea level variations due to remote sources such as ice melting and the second does not. The interannual sea level variability associated with key regional events such as the Eastern Mediterranean Transient are captured by the reconstruction but not by the model (at least in its present configuration). Hence, the reconstruction can be envisaged as a useful tool to validate further long-term numerical simulations in the region.