Geophysical Research Abstracts
Vol. 19, EGU2017-1629, 2017
EGU General Assembly 2017
© Author(s) 2016. CC Attribution 3.0 License.

The impact of upwelling along the Iberian-African margins on the Mediterranean sea level

Catarina Guerreiro, Álvaro Peliz, and Pedro Miranda
Dom Luiz Institute, University of Lisbon, Portugal (cgguerreiro@fc.ul.pt)

We use a barotropic ocean simulation covering the Northeast Atlantic Ocean and Mediterranean Sea to separate the effect of atmospheric pressure and large-scale winds on the Mediterranean sea level. The ocean model is forced with ERA-Interim Reanalysis for four specific configurations: 1) atmospheric pressure and winds, 2) atmospheric pressure only, 3) winds only in the Mediterranean and 4) winds only in the Atlantic. The response of sea level and net flow through the Strait of Gibraltar are analysed and compared with the Dynamic Atmospheric Correction sea level product and currentmeter data, respectively. The response from the first run is equal to the sum of the other three runs, showing they are addable. In other words, our ocean response to winds and atmospheric pressure is linear. Both sea level and net flow show a strong seasonality. Atmospheric pressure induces a Mediterranean sea level anomaly that is maxima in summer (+8 cm) and goes along with energetic transports at the strait (more than 1Sv). However, we get a lower sea level anomaly (+5 cm) when we include winds. Winds in the Atlantic Ocean generate a wind-setup along the Iberian and African margins that seems to influence the Mediterranean sea level. Our results show that during upwelling season, when North winds are predominant and intense, the negative sea level anomaly produced along the Iberian-African coast propagates into the Mediterranean. This signal is maxima from July to September and lowers the Mediterranean Sea by -3 cm. Other numerical studies using similar forcing conditions have identified the wind-setup anomaly on the Atlantic side, yet they do not explore its consequences into the Mediterranean. We show evidence that large-scale winds variability in the North Atlantic do contribute to Mediterranean sea level. Furthermore, our findings suggest that changes in the wind field during the upwelling season from one year to another could plausibly influence Mediterranean sea level. Such outcomes can be relevant for altimetry studies of the Mediterranean Sea.