



Steric contribution to the long-term sea level variations within the Gulf of Cadiz continental shelf

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The response of the long-term coastal sea level variations to the steric contribution has been explored within the Gulf of Cadiz (GoC) for the period 1997-2008 using tide gauge data as well as altimeter-derived sea level anomaly maps (AVISO). In order to remove the atmospheric pressure contribution, tide gauge data were corrected using the inverted barometer (IB) method. The AVISO maps were initially de-corrected using the Dynamic Atmospheric Correction product and then corrected using the same IB method. Steric height (ssh) time series were computed by combining a high resolution climatology ($0.1^\circ \times 0.1^\circ$) with monthly maps of AVHRR sea surface temperature considering a reference depth of 500 m at the open ocean and the bottom depth for shallower areas. In order to evaluate the steric effect on the long-term sea level changes, four types of steric contribution were defined: (1) The ssh values interpolated to the AVISO grid resolution were considered as the local steric effect. (2) The open ocean steric effect was computed by averaging all the steric heights corresponding to grid points located over the 500 m isobath and deeper. (3) The Eastern / Western continental shelf steric contribution was obtained by averaging over those grid points located within each continental shelf. (4) Finally, a basin-wide steric effect was computed by averaging the steric heights all over the GoC. The potential contribution of each of the defined steric effects on the pressure-adjusted sea level was evaluated. The open ocean contribution explained the highest percentage of variance all over the basin with the exception of the western shelf, where the best results were obtained with the local contribution, supporting the idea that the cell of cyclonic circulation found off Cape San Vicente is a local quasi-permanent feature. The fact that the open ocean steric effect explained the highest percentage of variance within the eastern shelf suggested that the deep ocean thermosteric anomalies transfer onto the shelf region, corroborating the idea that the local circulation there is strongly linked to the large scale circulation system.