



Contribution of climate forcing to sea level variations in the Mediterranean Sea

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With the availability of an abundance of earth observation data from satellite altimetry missions as well as those from the ENVISAT and CRYOSAT-2 satellites, monitoring of the sea level variations is gaining increased importance. In this work, altimetric data sets from the satellite remote sensing missions of ENVISAT and CRYOSAT-2 have been used to study the variations of the Mediterranean sea level. Alongside, a correlation analysis of Sea Level Anomalies (SLAs) with global and regional climatic indexes that influence the ocean state, has been carried out as well. The raw data used were SLAs from the respective altimetric missions, acquired by the on-board altimeters from the ENVISAT satellite for seven consecutive years (2003-2009) and from the CRYOSAT-2 satellite for six consecutive years (2010-2015). Three oscillation indexes have been investigated, as representative of climate-change and seasonal forcing on the sea level. The first one was the well-known Southern Oscillation Index (SOI), the next one the North Atlantic Oscillation (NAO) index and the third, being primarily more representative of the Mediterranean sea state, was the Mediterranean Oscillation Index (MOI). The possible correlation is investigated in both monthly and annual scales, while a regional multiple regression and a principal component analysis (PCA) between the SLAs and oscillation indexes is carried out. Multiple regression and PCA have been used as tools in order to deduce possible correlations between the Mediterranean sea level variations and the aforementioned oscillation indexes, under the assumption that SLA variations are driven by steric forcing. Finally, evidence of the sea level cyclo-stationarity in the Mediterranean Sea is deduced from the analysis of empirically derived covariance functions at monthly intervals from the available SLA data.