

A 37-YEAR ANALYSIS OF THE STORM SURGES IN THE MEDITERRANEAN AND BLACK SEAS

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Introduction/Aim: Storm surges are caused by severe weather conditions concerning deep low-pressure systems, and are primarily responsible for extended coastal inundation along the Mediterranean and Black Sea coastlines, especially in low-land coastal areas, causing destruction of infrastructure, natural resources and even human casualties. The inter-annual evolution of intense storm surge events in the coupled system of the Mediterranean and Black Seas is investigated, focusing on annual maxima, trends and spatiotemporal variability of them, correlated to the morphological diversity of certain coastal areas during the last four decades.

Methods: The numerical simulations of storm-induced sea level height (*SLH*) have been implemented with a 2-DH hydrodynamic shallow water equation model for storm surges (MeCSS; Androulidakis et al. 2015), which has a 1/20°×1/20° spatial resolution and runs in climatic mode for a 37-year period (1979-2015). The atmospheric forcing refers to downscaled (12 Km × 12 Km) gridded ERA-Interim (<http://apps.ecmwf.int/datasets/data/interim-full-daily/>) data of wind and sea level pressure fields.

Results: The MeCSS model has been extended to cover the Black Sea basin and is validated against field data, based on annual maxima of *SLH* and Storm Surge Index (*SSI*), inter-annual high-order percentiles of *SLH*, probabilities of occurrence of coherent, intense and extreme storm surge events (Makris et al. 2016). Graphical outputs of the simulated results of annual *SLH* maxima and 37-year statistically significant (based on Mann-Kendall test) trends are produced, together with representative validation comparisons via box-plots of *SLH*, Willmott skill scores and Pearson correlation coefficients, covering segmented periods from 1980 to 2012 in several Italian and Greek stations (Makris et al. 2015, 2017).

Main Conclusions: The MeCSS model can adequately reproduce the status of storm surges during the last four decades in the Mediterranean and Black Seas. There is a statistically significant increasing trend of annual storm surge extremes and *SSIs* in the Mediterranean and Black Sea coastal zones towards the first quarter of the 21st century.

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