

EGU2020-7459

<https://doi.org/10.5194/egusphere-egu2020-7459>

EGU General Assembly 2020

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## Long-term assessment of surface dynamics in the Tyrrhenian Sea

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The variability of surface dynamics has been investigated extensively in the Mediterranean Sea for different temporal and spatial coverage, whereas a specific evaluation for the area of the Tyrrhenian Sea does not exist. Thus, this study is focused on the Tyrrhenian basin, a subbasin of the western Mediterranean, which is considered sensitive to climatic variations due to its small size and isolated nature. The main scope is to provide a comprehensive and up-to-date assessment of the sea surface warming, the sea level changes and the general surface circulation in the Tyrrhenian Sea, as well as to improve the understanding of the relation to large-scale teleconnection patterns and to regional air-sea interaction. The long-term spatio-temporal variability and trends were investigated using satellite-derived, in-situ and reanalysis-based datasets up to the end of 2018. Further, the possible linkage with the occurrence of extreme weather events was assessed using observations from the European Severe Weather Database. The different datasets cover multiple temporal and spatial scales and enable the investigation of the potential physical processes related to the non-homogeneous, time-dependent spatial variability. The results indicate a significant increase in sea level and sea surface temperature which appears to be linked with the North Atlantic Oscillation (NAO) and the Atlantic Multidecadal Oscillation (AMO), respectively. Moreover, analysis of the basin's surface circulation together with local air-sea exchanges of heat, freshwater and momentum indicated a significant influence of the wind-driven Ekman pumping variability.