**Extreme sea levels and wind-waves in the Mediterranean Sea since 1950**

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**Abstract**

In the Mediterranean Sea, coastal extreme sea levels are mainly caused by storm surges driven by atmospheric pressure and surface winds from extratropical cyclones. In addition, wind-waves generated by the same atmospheric perturbations may also contribute to coastal extremes through wave setup (a temporary rise in mean sea level due to waves breaking close to shore). This study investigates the spatial and temporal variability of coastal extreme sea levels within the Mediterranean basin, using a new ocean hindcast generated with a coupled hydrodynamic-wave model that simulates storm surges and wind-waves generation and propagation. The numerical simulation spans the period 1950-2020 and is run with high temporal sampling (1h) and at unprecedented spatial resolution that reaches 200 m along the coastlines. . Coastal storm surges and wave heights have been extensively validated with available observations (tide gauges and waves buoys). Comparison to tide gauges shows an average RMSE of 0.05m (0.08m for extreme events) and linear correlation of 0.75 for the period covering 1980-2020. Similarly, comparison of simulated and observed significant wave height shows good agreement with RMSE lower than 0.25 m and coefficient correlation as high as 0.95. Preliminary results show that coastal extreme sea levels found are more likely to be located in regions with wide and shallow continental shelves, where mild slope favour the combined effects of wind and wave setup. The contribution of waves to coastal extreme sea levels has been explored with an uncoupled simulation and has been shown to be significant, reaching up to 120% of observed maximum sea levels.