EGU22-6633, updated on 19 May 2023
https://doi.org/10.5194/egusphere-egu22-6633
EGU General Assembly 2022

Observed changes in sea breezes over the Western Mediterranean basin, 1961-2020

Shalenys Bedoya-Valestt[1], Cesar Azorin-Molina[1], Luis Gimeno[2], Carlo Cafaro[3], Eduardo Utrabo-Carazo[1], Miguel Andres-Martin[1], Jose A. Guijarro[4], Enric Aguilar[5], and Manola Brunet[5]

[1]Spanish National Research Council (CSIC), Centro de Investigaciones sobre Desertificación, Moncada, Spain (shalenys.bedoya@ext.uv.es; cesar.azorin@csic.es; eduardo.utrabo@ext.uv.es; miguel.andres-martin@ext.uv.es)

[2]Environmental Physics Laboratory (EPhysLab), CIM-UVigo, Universidade de Vigo, (Ourense), Spain. (l.gimeno@uvigo.es)

[3]University of Reading, Meteorology, Reading, United Kingdom of Great Britain – England, Scotland, Wales (c.cafaro@reading.ac.uk)

[4]Climate Data Management consultant retired from the State Meteorological Agency (AEMET), Balearic Islands, Palma de Mallorca, Spain (jaguijarro21@gmail.com)

[5]Universitat Rovira i Virgili, Centre for Climate Change, Tarragona, Spain (enric.aguilar@urv.cat; manola.brunet@urv.cat)

Climate change may affect sea breezes in their magnitude and occurrence, having direct implications for the hydrologic cycle and desertification (i.e., development of sea breeze thunderstorms), air pollution dispersal, wind energy production, to name but a few. To date, trends and multidecadal variability of sea breezes have been barely quantified because of the scarcity of long-term series, the low spatial-temporal resolution and the unreliability of observations over land-sea surfaces. Recent studies showed an increase in the occurrence of sea breeze days for the Eastern Spain, as well as opposite trends between the mean speed and gusts. The causes behind these opposite trends remain unknown because of the complexity of thermally driven coastal wind systems. The aim of this study is to advance in the knowledge of the observed changes in sea breezes over the Western Mediterranean area for 1961-2020, and their likely causes. To do so, we will first apply a robust automated algorithm based on alternative criteria to detect potential sea breeze events. Then, we will use homogenized wind speed and gusts data from sub-daily observations across the Mediterranean region to quantify the magnitude and significance of changes in sea breezes for 1961-2020. Finally, we will estimate the relationship with large-scale circulation (e.g., modes of variability, weather types and mean layer vector wind) and physical-local factors (e.g., land use changes and land-sea air temperature gradient) from ERA5 reanalysis to better understand the likely causes behind the observed changes in sea breezes.