EGU22-12350
https://doi.org/10.5194/egusphere-egu22-12350
EGU General Assembly 2022

Statistical characterization of the physical mechanisms under Sea Breeze conditions in a complex terrain island

Antoni Grau Ferrer and Maria A. Jiménez
Universitat de les Illes Balears, Palma, Spain (antoni.grau@uib.es)

The island of Mallorca (western Mediterranean Sea) is taken in this work to statistically characterize some of the physical mechanisms involved during Sea Breeze (SB) conditions. It is a complex terrain island with two main mountain ranges (at the north and east) and an elevated area in its center, which defines three main basins: Palma in the west, Alcudia in the northeast and Campos in the southwest.

The physical mechanisms that take place under SB conditions are analysed through the inspection of data from automatic weather stations (AWS) from the Spanish Meteorological Agency (AEMET) during the period 2009–2021. Hourly satellite-derived land-surface and sea-surface temperatures (LST and SST, respectively) are used to compute the surface temperature difference (LST–SST) in the three basins. Besides, a method (Grau et al, 2020) is taken to select the SB events separately in the three basins using data from AWS during the warm months of the year (from April to September).

Results show that the surface temperature difference changes in the three basins pointing that other physical mechanisms are present during SB conditions. For instance, it is explored the role of the large-scale winds in the strength of the SB, the influence of the shape of the basin in the propagation of the SB front and the importance of the vertical temperature gradient (T850hPa – LST) for the SB initiation. It is found that there are differences in the SB features of the three basins (maximum wind speed, initiation and duration of the SB, strength of the horizontal thermal gradient) and SB conditions are not simultaneously met. Besides, interactions between SB and locally-generated winds at the slopes that close the basins are important and they can enhance/diminish the wind locally.