



Characterization of the physical mechanisms under sea-breeze conditions through in-situ and satellite observations

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The Sea-Breeze (SB) in the island of Mallorca is a common regime that takes place during most of the days of the warm months of the year (from April to October) and specially in the three main basins (Palma, Campos and Alcúdia). Previous numerical and observational studies have shown that this locally-generated wind has a clear-diurnal cycle (Cuxart et al., 2014; Jiménez et al., 2016). The different phases of the SB are strongly linked to the surface temperature difference between land and sea, which is further analyzed in this work through satellite-derived surface temperatures. Hourly Land-Surface and Sea-Surface temperature fields (LST and SST) are taken from Meteosat Second Generation during 5 years (2013-2017). The days with SB are selected through a proposed filter of the observations taken from two surface weather stations: near the coast (the Airport) and more inland (about 9km from the coast, at the University Campus). Results show a good correlation between this temperature difference and the intensity of the SB reported over the coast as well as its propagation through the land. Background winds can also modify this temperature difference as well as the speed of the maximum and the initiation of the SB. It is also found that the characteristics of the sea-breeze front depends on the topography over land behind the coast. The effect of the soil moisture on the SB features is also explored, as well as the shape of the coast. To extend the years analyzed and better characterize the temporal variability of this regime, a new filter is taken considering only the observations at the Airport (the longest time series; records since 1997).