



Influence of synoptic-scale flow on sea breeze evolution: A study of the dynamics of wind hodographs

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A case study on influences of synoptic-scale flow on sea breeze development on the eastern coast of the Iberian Peninsula (Valencia region, Spain) is presented. The sea breeze episodes of 11 and 12 August 2004 were chosen and hourly wind hodographs from 15 meteorological stations were analyzed. The mean layer vector wind (MLVW) averaged from 1000 to 700 hPa were computed using rawinsonde data in Murcia (08430 station) to designate the synoptic-scale regimes influencing the sea breeze evolution. The synoptic-scale situation on 11 August 2004 corresponds to a light to moderate (4.6 m s^{-1}) onshore MLVW regime from S (188.6°) whereas the situation on 12 August 2004 represents a strong (7.8 m s^{-1}) offshore regime from W (257.6°). The sea breeze features that are examined are mean lag of the sea breeze passage, wind speed and direction at the time of onset, mean lag of the sea breeze cessation, mean temporal dimension or duration, the mean maximum velocity, inland propagation, and rotation of the sea breeze flows. Some of the sea breeze characteristics are studied for the first time as they have not been regarded in the literature. It is found that in comparison with the onshore synoptic episode, offshore one favored delayed arrival and early termination of the sea breeze, resulting a shorter mean duration, more intense sea breeze passages, a stronger mean maximum velocity, shorter mean inland penetration, and an anticlockwise rotation of the sea breeze. These results essentially support other numerical modeling results. Further analysis should be done using more years of added data to generalize the findings.