



Breeze events on the French Mediterranean coast during the ESCOMPTE campaign : numerical simulations and experimental data analysis

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In this study, a detailed analysis is made of two breeze events occurring on the French Mediterranean coast (during the 24-25 June 2001 and 02-03 July 2001 periods). These periods are parts of the ESCOMPTE campaign held in the Marseille region in June-July 2001, where many simultaneous meteorological experiments were made. These data are used for the analysis of breeze cases as well as to validate numerical simulations ran for these periods.

The east part of the French Mediterranean coast is characterized by complex topography (with mountains close to the coast) and coastline, two main valleys (Rhône and Durance), Berre lake and urban areas like Marseille, Toulon and Nice. The thermal driven circulation of air involves then complicated physical processes that must be accurately described.

Numerical simulations have been made with the Regional Atmospheric Modelling System (RAMS) running with three nested grids. The coarsest one has a 15 km resolution and covers the south-east part of France. The finest has a 1 km mesh in order to take all the fine topography details into account in the Marseille area. Topography and vegetation type were used with a 30" resolution and a nudging every 6 hours was made to take synoptic conditions into account. Experimental data used for analysis and validation were collected during the ESCOMPTE campaign from radiosondes, ground stations and radars in several sites.

Numerical results are found to be in good agreement with experimental measurements (wind intensity and direction, temperature and relative humidity). Special attention

has been paid to inland and offshore penetration of sea/land breeze fronts, to vertical extension of breezes (shallow and deep breezes) and to wind fields at 100 m above surface level. The effects of fine topography (2-3 km) such as channelling, blockage and contouring by relief close to the shore and wind protected areas have been observed.

This study will be useful for the dispersion of pollutant over coastal agglomerations, for marine aerosol transport studies and to determine the location of future offshore wind turbines which may be set along the French Mediterranean coast.