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APPLICATION OF THE MODEL ADREA-I TO THE ESCOMPTE PRE-CAMPAIGN CASE

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EXTENDED ABSTRACT

The mesoscale non-hydrostatic meteorological prognostic model ADREA-I has been repeatedly used for the simulation of thermal winds circulations over complex topographies in coastal and mountainous regions. The meteorological fields produced by the model are subsequently used as input for computations of atmospheric dispersion for the assessment of air quality in urban areas and for the environmental impact studies from industrial activities. The evaluation and quality assessment of ADREA-I is very essential and has been set as a top priority of the Environmental Research Laboratory, of the Institute of Nuclear Technology and Radiation Protection of National Centre for Scientific Research "Demokritos".

In this paper the application and evaluation of ADREA-I for the ESCOMPTE_INT exercise is presented. The ESCOMPTE_INT is an internet-based exercise for the evaluation and inter-comparison of mesoscale models, based on the ESCOMPTE pre-campaign data set over the Greater Marseille Area in southern France. The model performance is examined by means of comparison of predicted wind speed and direction as well air temperature near the ground with observations, using established statistical indices. Vertical profiles of meteorological variables are also compared to existing measurements. The simulated period concerns 3 consecutive summer days with sea breeze formation during the last two.

The influence of two factors on the model predictions is examined in this study: the wind boundary conditions and the grid resolution. The main assumption tested in this first step application of the model to this case is that the synoptic wind remains constant during the simulated period, which is not totally accurate. So the model boundary conditions for the wind are kept constant to their initial value. A model sensitivity study is also performed in the framework of this exercise. This concerns the model response to different grid resolutions, always examined by comparison of the model results with the observations. The conclusions drawn from the present study concern the performance of the ADREA-I model in simulating the meteorological fields in cases where the latter favour the occurrence of air pollution episodes, such as sea breeze conditions in Mediterranean areas.

Key words: CFD, mesoscale model, sea breeze, model evaluation, ESCOMPTE.