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Numeric Simulation of the Planetary Boundary Layer around a Power Plant over Portugal

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The vertical extent of the Planetary Boundary Layer (PBL) is proportional to the intensity of the turbulence, varying from few hundred meters (stable conditions) to few kilometers (unstable conditions). The time and space evolution of the pollutants release at the surfaces depend primarily upon the evolution of the PBL. The purpose this work is investigate diurnal variation of the PBL near stack in Barreiro, located in the left margin of the Tejo River, about 40km distance of Lisbon. The simulations were made using the Regional Atmospheric Modeling System (RAMS). It is frequently used to simulate atmospheric phenomena on the mesoscale (horizontal scales from 2 km to 2000 km) for applications ranging from operational weather forecasting to air quality regulatory applications to support of basic research. The initial and lateral boundary conditions necessary to run RAMS were taken from the NCEP's Reanalysis. Nested grids were chosen to have resolutions of 4 km and 1km respectively and surface stations data to verify appropriate meteorological conditions for the development of PBL. The results show more detailed for the grid of larger resolution (1 Km) indicate that latent and sensible vertical turbulent fluxes have maxima values at the surface and linear decrease upwards, favoring the transportation of heat e moisture into higher atmospheric levels. At the nocturnal boundary layer, the fluxes present very small values compared with those at the daytime. Therefore, daytime temperature and humidity profiles are in much better agreement with observed ones. Similar results are obtained for latent and sensible soil fluxes and radiation budget showing the new radiative scheme and cloud cover condition implemented into the model are very efficient to simulate the surface energy budget and temperature diurnal variation near surface.