

Evening transitions of the atmospheric boundary layer: global characterization and case studies

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The main characteristics of turbulence in the atmospheric boundary layer are often ruled by the daily cycle of the Earth surface heating and cooling, so that two main configurations are often found: convective and stable one. The transition from a diurnal convective boundary layer to an usually stable nocturnal one is not still quite well understood, partly because many different micrometeorological conditions at sunset -or a few hours before- might be critical for the establishment of a strong surface-based stability or a weak one. Remarkable differences can be found even for very similar synoptic conditions.

Data from the CIBA site (Research Centre for the Lower Atmosphere), located in Valladolid (Spain) on a quite flat terrain are used to look into the evening transitions. Instrumentation includes sonic anemometers and three surface microbarometers, which provide high resolution data, apart from typical wind, temperature and humidity sensors at different heights at a meteorological mast.

We study the principal turbulent and stability parameters and try to find out some threshold values which help us to distinguish and classify different conditions. Exploring the origin of these turbulent processes -either mechanical or thermal- in each case is also one of the objectives of this work. Mean properties of the transition and case studies are investigated.

Finally, the WRF model is used to obtain simulations with different PBL parameterizations, trying to reproduce the main features of the evening transition.