



Seasonal analysis of the planetary boundary-layer afternoon and evening transition through observational measurements

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From a typically convective diurnal situation to a stably stratified nocturnal one, the atmospheric boundary layer (ABL) experiences the so-called afternoon and evening transition. This period is complex to study due to the presence of many different forcings, usually weak and opposite [1].

In this work, the transitional processes are studied by using 6-year data from permanent instrumentation at CIBA, a research center located in the Spanish Northern plateau. These measurements include particulate matter (PM) and turbulent records. Certain variables display a twin pattern in their time evolution for all the seasons, only differing in their absolute values. On the contrary, the air specific humidity behaves differently for each season, which is distinct to the results from a previous study at a different location [2]. Besides, a common pattern of increasing PM values near sunset is found, with a number of influences playing a role in PM concentrations: stability, turbulence and ABL thickness among others. In particular, the competing thermal and mechanical turbulent effects result in PM concentration reduction (settling on the ground or being advected) or increase, depending in each case on the specific season and particle group. Furthermore, the relative importance of the bigger PM (between 2.5 and 10 μm) is linked to the wind minimum around sunset, especially during summer.

[1] Lothon, M. and coauthors (2014): The BLLAST field experiment: Boundary-Layer Late Afternoon and Sunset Turbulence, *Atmos. Chem. Phys.*, 14, 10931-10960.

[2] Wingo, S. M. and Knupp, K. R. (2015): Multi-platform observations characterizing the afternoon-to-evening transition of the planetary boundary layer in Northern Alabama, USA, *Boundary-Layer Meteorol.*, 155, 29-53.