

## ***Interactive comment on “Continuous atmospheric boundary layer observations in the coastal urban area of Barcelona, Spain” by M. Pandolfi et al.***

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Review " Continuous atmospheric boundary layer observations in the coastal urban area of Barcelona, Spain" by M. Pandolfi et al.

The authors describe a measurement campaign targeted to retrieve the mixing layer height and the height of the decoupled convective layer from radiosonde data and aerosol backscatter measurements. These latter measurements were continuously performed for about one month in autumn 2010 by a Jenoptik CHM15K ceilometer. Results are discussed for three different but typical synoptical situations in the Western Mediterranean Basin.

General comment: The paper is well written and the main results are presented in a

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reasonable and comprehensible way.

Nonetheless, the authors should strive for making clear the main goal of the paper. This is, in my view, the missing element. The results presented in this paper are somewhat foreseeable. The Western Mediterranean is mainly affected by air masses originating from the South-West/East (the NAF scenario) and the West (the ATL scenario) while regional contributions become stronger during stable weather conditions. This is or was already known. Therefore, one could, to some extent, expect and estimate the way the mixing layer heights would vary when moving from one scenario to the other. To some degree one may conclude also the behaviour of the aerosol backscatter during these scenarios. The authors quantified these changes but results are not a surprise which limits in some way the value of the paper. There were already several studies in the past dealing with similar issues (following the list of references and especially with respect to the paper of Sicard et al. 2011) and it is therefore even more important to make clear why this paper contributes significantly to the scientific discussion.

My recommendation is therefore to think about the following reorganisation of the paper:

1) It would be helpful to formulate the open scientific question to be answered at the beginning of the paper. Then the reader is guided through the paper and results shall give the answer to the question opened at the beginning. A conclusion (which is missing !) could discuss possible applications of the knowledge gained. This kind of red line would be very helpful to judge the authors contribution to the scientific work level made. In other words, it should be clear after reading the paper why this paper has actually been written.

2) The authors should spend some more time discussing the way retrieving aerosol backscatter coefficients from the uncalibrated raw data of the Jenoptik instrument. Paragraph 2.2.1 is ways too short to give the reader an idea about how the retrieval was performed under which additional assumptions and/or the usage of additional data.

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3) The entire section 4 (Discussion) repeats a lot of things said before in sections 3.2 and 3.3. It is less a discussion than a continuation of the results section. P361, l27: The entire paragraph is actually something new here and could be (at least partly) moved to the results section. The discussion section is not the best place for introducing new results.

On P352, l23 the authors say that "Data from the ceilometer were carefully cloud screened to avoid any bias due to cloud scattering." On p354, l4 the authors further say "The AERONET cloud screened Level2 data were used in this work." So the natural question is in which way the cloud screening has actually been done. Please clarify how the cloud screening was performed.

Some minor comments:

P 347, l11: "with the deepest values" → "with the lowest values" ?

P 347, l15, l23; P348, l6: The authors use several times the expression "PBL depth". It is maybe more convenient to use "PBL (top) height" instead.

P 350, l7: occupy → cover ?

P350, l9: making this region one of the most polluted → making this region to one of the most polluted

P353, l18: but which may also characterise the nocturnal atmosphere → but which are also typical for the nocturnal atmosphere ?

P 353, l22: were obtained with a meteorological station → were obtained at a meteorological station

P360, l12: overhanging → overlying ?

P361, l16ff: The authors preselected/predefined three different scenarios for their analysis. ATL, NAF and REG. Why is then argued here that "The presence of African air masses above Barcelona during NAF could be one of the reasons for the good agree-

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ment observed between radiosondes and ceilometer in estimating the SML heights during NAF." I mean you have selected such days when air masses were advected from the Saharan desert. So it is first no surprise that African air masses were above Barcelona during NAF and it is secondly not a stand-alone argument for coincident results. Please rethink your arguments.

P 364, l4: The summary could become part of the missing section "Conclusion". Following the references provided your first two items aren't really surprising results. This brings me back to my general comment at the beginning about the overall goal/scientific question answered by this paper.

P 372 pp: Fig 1: Please enhance these images (a lot). Your readers have probably less good eyes than you ... Figs 2 and 3 are much better, Figs. 4 to 6 could/should also be enhanced.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 13, 345, 2013.

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