

# ***Interactive comment on “Characterization of Boundary Layer Turbulent Processes by the Raman Lidar BASIL in the frame of HD(CP)<sup>2</sup> Observational Prototype Experiment” by Paolo Di Girolamo et al.***

## **Anonymous Referee #1**

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This paper presents measurements of higher-order moments (up to 4) of turbulent fluctuations of water vapour AND temperature, simultaneously, with 2-hourly temporal and vertical resolution made with the Raman lidar BASIL during the field campaign of the HOPE project.

The paper describes the methodology to achieve this as well as the details of the system upgrades, signal corrections and signal processing needed to achieve the measurements of profiles of higher-moment turbulent variables. First results are presented for a case study, which look very promising. Overall, it is a very impressive effort.

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The paper is well written and clearly structured. The English is very good. In my opinion, this paper deserves publication in ACP. I only have minor modifications to suggest.

### Minor comments

The potential for BASIL to measure profiles of moments of turbulent fluctuations in the PBL is of great interest to the community. In the paper, only a short sample of the dataset acquired during HOPE (2 hours) under “ideal” meteorological conditions is presented. I am convinced that such data acquired in more complex situations would be extremely worthy, and that obtaining from an instrument such as BASIL the diurnal evolution of profiles of higher-order moments of turbulent fluctuations would be invaluable for understanding PBL processes associated with night-day transitions, PBL development under cloudy situations and model validation. At the end of the paper, the authors provide some leads concerning future studies to be undertaken with the BASIL dataset along these lines. I think it would be worthwhile discussing in the paper (maybe in the final section, 1 short paragraph) to what extent the temporal resolution of the flux profiles retrievals could be reduced to hourly (or less) temporal resolutions and if a realistic diurnal evolution of these variables can be extracted from the impressive HOPE dataset.

P6, I21: I am aware that moisture profiles can be extracted from GPS tomography. Can this also be done for temperature? Or is it just a cut/paste from the water vapour paragraph above?

P17, I26: “starting”

P18, I18: “aerosols property”

P19, I24-25: “[...] as in fact. ... column.” This sentence is unclear, please rephrase.

Figure 9: it is a bit odd to see that a large part of the signal is off-scale on this figure. Why is it so? This should be improved.

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Figure 13: same comment as above, especially for Fig. 13b.

End of review

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