Atmos. Chem. Phys. Discuss., 14, C10442–C10444, 2014
www.atmos-chem-phys-discuss.net/14/C10442/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Temperature profiling of the atmospheric boundary layer with rotational Raman lidar during the HD(CP)^2 observational prototype experiment" *by* E. Hammann et al.

Anonymous Referee #3

Received and published: 24 December 2014

The paper presents measurements of temperature and humidity taken during the HOPE campaign with a Raman lidar using the rotational Raman technique. A novel feature of the system is that it can measure in two configurations, optimized for high and low background conditions, respectively. The performance of the two configurations and the capability to measure water vapor and temperature gradients simultaneously are demonstrated.

The paper is well written and the content is innovative and scientifically relevant and well presented. I recommend the paper for publication after minor revisions as specified below.

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General comments

The text of the paper, in particular abstract and summary&outlook, should be more quantitative when explaining the benefit of the two background configurations. For example formulations like "significant advance", "advantages of new background confifuration" and "the high background setting shows low statistical error" should be quantified.

Generally, the first person plural is not good scientific language and should be avoided.

Specific comments

p28976, l7: this is a very incomplete list of references. Either put "e.g." at the beginning or add the missing references.

p28979, l3: specify that it is referred to corrected (background, saturation, . . .) signals.

p28980, l14: please specify how saturation effects are accounted for.

p28984, l8: explain how the averaging affects the statistical errors according to equation 4,5 and 9.

P28984, l17: This approach needs to be justified and validated. Behrendt et al. 2014 does not give any justification or validation and cannot be referred to, here.

P28985, l20: "This first..." it is not quite clear what the authors want to say here.

P28986, l8: remove the unit from the equation.

P28989, l6: "Absolute values..." this phrase is not clear.

P28991, l21: The layer at 2km seems to contain no humidity at all. Not even the error bars reach positive values. Could the authors comment on that?

p28991, l24: For a non lidar person this phrase is close to incomprehensible. "Poisson statistics" is not, and should not become, a generally accepted term for "signal noise". In particular not, when analog signals are considered (see comment above).

ACPD
14, C10442–C10444, 2014

P28992, l15: As a suggestion, this could be validated with a microwave radiometer, if available on site. In the first few hundreds of meters the vertical resolution is good enough to measure such gradients.

P28993, l3: Do the authors mean "lower"? Give a number how low "low" (or lower) is.

p28993, l11: "convenient" for what? Later in this phrase, be clear that it is referred to the statistical error only.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 28973, 2014.