Atmos. Chem. Phys. Discuss., 14, C10064–C10066, 2014
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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 #1**

Received and published: 12 December 2014

This paper reports the results of the temperature and water vapor mixing ratio measurements with the rotational Raman lidar of the University of Hohenheim. It also describes the lidar system and the numerical simulation of the temperature measurement. The results presented in the paper are original to my knowledge and interesting. Thus, I believe that the paper can be published in ACP after minor revisions. The suggestions of the corrections are given below.

1) P28974, L12 and P28983, L9: Does the switching for the passband (changing inclination angle of the filter) of the second rotational Raman channel automatically or manually? Please explain.



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2) P28977, L4: Please note the location (i.e. latitude, longitude, and elevation).

3) P28979, Eq. (4): I think that a factor of 2 should be multiplied to P_B1 and P_B2. Also P_BWV and P_BRR in Eq. (9).

4) P28980, L1: Please add the reference paper that describes how Eq. (5) is derived from Eq. (1).

5) P28983, L15: How did you obtain the beam divergence in the polychromater? Is it based on the measurement or theoretical computation? Please explain it.

6) P28983, L28: I can't find the number 37.5 m in table 2.

7) P28984, L7: Please provide the values of dead-time of the photomultiplier tubes. It would be helpful for the users using the same type of PMT.

8) P28986, L23: Please tell me how the beam divergence affects the result of simulation. How the shape and size of the circles of temperature uncertainty in Figs. 5 and 6 change

9) P28989, L3: Was it possible to assume that S was zero over the altitude for the low background condition?

10) P28990, L2: Please provide the elevation angle of the lidar (i.e. vertical or slant pointing).

11) P28990, L8-9: Please provide the values of altitude ranges of the nocturnal boundary layer.

12) P28990, L10: Please provide the values of altitude range of the boundary layer.

13) P28991, L6: How did you obtain atmospheric pressure that is necessary to compute the potential temperature? Please explain.

14) P28993, L13: Please provide the value of the relative error (in percentage) of MR.

15) P29000, Table 3: Is CWL2 of 352.95 (L) correct? Or is it 353.05?



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16) P29001, caption of Fig.1: Please add the reference papers that report that fluorescence can affect the Stokes line based on the measurement.

17) P29010, Fig. 6: Please explain the possible reasons of the large difference (ïĄ¿0.3) in Q_norm between the radiosonde and the simulation for the high background setting below 265 K.

18) P29014, Fig. 13: Please point the time when you changed the setting of IF3 between the high and low background mode.

19) P29014, Fig. 13: The temperature gradient below 1 km for 14-16 UTC on 19 May and 16-17 UTC were super adiabatic (-2.0 K/100 m). Do you think they were real or in measurement error? Please comment on it.

20) P29015, Fig.14: We can see that there were many spots of high (ïĄ¿3 K/100 m) temperature gradients for a few minutes were present at an altitude of 1.5 km over the measurement period. Were it statistically significant (within the measurement error)?

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