Atmos. Chem. Phys. Discuss., 8, S3379–S3381, 2008
www.atmos-chem-phys-discuss.net/8/S3379/2008/


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "First airborne water vapor lidar measurements in the tropical upper troposphere and mid-latitudes lower stratosphere: accuracy evaluation and intercomparisons with other instruments" *by* C. Kiemle et al.

**Anonymous Referee #1**

Received and published: 5 June 2008

This manuscript presents results from and describes a DIAL water vapor LIDAR system. Error characteristics and differences with other in-situ and satellite observations are presented. The paper is generally well written and complete and the methodology is sound. It should be publishable in ACP with several minor corrections.

Specific Comments:

1. Introduction, paragraph 2: The radiation balance is "In clear sky an air parcel is forced to ascend (descend)...."



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2. Section 2.2, last paragraph: Can you state what the range limits are in distance from the aircraft? Also, in Figure 2, can you make the vertical resolution explicit (and the varying resolution) by making the figure from filled boxes whose size represents the individual point volumes, which I assume would increase in height away from the aircraft.

3. Section 2.3 and Figure 2: Where are the particles described in the first paragraph of section 2.3 in Figure 2? Can you show the particles/cloud outline on the figure. This would make the description and analysis much clearer.

4. Section 2.4 (after eq 1): Here you state that the resolution is 'better than 500m', but in figure 2 the layers are thinner than 500m, which is also typical of supersaturated layers in the upper troposphere (Spichtinger et al, 2003: though this is the mid-latitude Upper Troposphere). How does this affect the results?

5. Discussion, last 2 sentences: The 'quasi-straight lines' are not evidence of a TTL, they are just the slope of the Clausius-Clayperon equation on a log plot in the 11-16km region. I do not see how your analysis implies anything about the existence of a TTL. This is just the response of water vapor to decreasing temperatures. Please justify better or eliminate. Also, the line in the conclusions (section 5) on this needs changing.

6. Conclusions, last paragraph, first line: what 'aerosol backscatter'? You do not show any results here. I would eliminate this statement.

7. Table 2: please add up the errors for the last row to get 7-10%. Simply making a footnote is misleading.

8. For figure 6, can you put 1sigma variability on the DIAL profiles?

9. Variability would help with figure 7 as well: can you shade some of the profiles, or +/- the zero line, with uncertainties or 1sigma variability from MIPAS and/or DIAL?

Reference:



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P. Spichtinger, K. Gierens, U. Leiterer, and H. Dier. Ice supersaturation in the tropopause region over Lindenberg, Germany. Meteorologische Zeitschrift, 12(3):143-156, 2003

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 10353, 2008.



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