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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterization of the planetary boundary layer height and structure by Raman lidar: comparison of different approaches" *by* D. Summa et al.

Anonymous Referee #2

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In this paper, the authors present a new approach to determine the height of the planetary boundary layer (PBL) by applying a widely used technique (first order derivative) to range-corrected rotational Raman lidar signals. They compare the results to PBL retrievals from potential temperature soundings as well as range-corrected elastic lidar signals. The new method is tested using the rich BASIL dataset acquired during the COPS campaign in the summer of 2007.

The paper is clear and well written. I also appreciate the fact that the authors continue to analyze the wealth of data that they acquired during COPS (8 days of measurements in this paper).

I think the study proposed here is worth publishing in AMT, but the paper needs a bit more work before I can recommend publication.

Major comments

The authors claim that the new approach proposed in the paper can help overcome the limitations associated with the use of lidar-derived elastic backscatter signal, especially in the afternoon and after sunset in the presence of elevated aerosol layers. In my opinion, they do not really demonstrate that. They show that the retrievals obtained using all three techniques in a variety of meteorological conditions are in good agreement (as shown by the low bias and the high correlation coefficients detailed in the paper).

However, in case there are discrepancies between the 3 approaches, the authors do not explain which is best and why nor do they discuss the possible origin the differences. I think this is a major lack of the paper since from the comparisons it is not possible to assess whether one lidar-based approach should be preferred over the other.

In the COPS dataset, the authors should identify cases when the PBL retrievals based on elastic backscatter fail to identify the PBL top height and demonstrate that the approach based on the Raman lidar signal is more efficient in such cases to properly detect the PBL height.

Finally, I think it is a bit illusive to claim that one retrieval technique has an edge over all the others. . . With the nice capabilities of BASIL, the authors have a chance to show how both lidar based approaches can be used together to provide a reliable continuous monitoring of the PBL height.

End review

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 5195, 2013.