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Interactive comment on "**3D Water Vapor Field in the Atmospheric Boundary Layer Observed with Scanning Differential Absorption Lidar**" *by* **F. Späth et al.**

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We thank the reviewer for reading the manuscript in detail and for her/his very helpful comments to improve the manuscript. We would like to respond briefly to two of the comments already here and will give a detailed response to all comments with the revised version.

Concerning the Rayleigh-Doppler correction and Eq. (4) and (5) and Fig. 2: Equation (4) gives the full DIAL equation including the Rayleigh-Doppler (RD) correction term (2nd term). Figure 2 shows the flow chart of the water vapor calculation with all needed parameters to compute the humidity data. This includes also β_{par} and β_{mol} for the RD correction. If the RD effect is small we skip the additional effort (and related

uncertainties) of the RD correction and apply only the simplified DIAL equation (Eq. (5)), the so-called Schottland approximation.

On page 7, line 24 we discuss the RD correction for the presented cases here and explain that this effect was not critical for two reasons: no large β_{par} gradients within the ABL and an online frequency located at the wing of the absorption line. Consequently, Eq. (5) was used here throughout the manuscript.

We are going to clarify this in the revised manuscript.

Concerning the overlap issue and the gaps in the measurements of Fig. 6:

The gaps occur from clouds at the top of the CBL. Lidars cannot measure beyond optically thick clouds. Thus, only measurement data along the line of sight up to the cloud edge are available. In the near range of the RHI scans we omitted the data up to 950 m because of overlap effects (field-of-view of the transmitting and receiving telescopes). This effect could be reduced significantly during the SABLE campaign to distances of only 200-300 m to the lidar.

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