

Interactive comment on “Ground based lidar and microwave radiometry synergy for high vertically resolved thermodynamic profiling” by M. Barrera-Verdejo et al.

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According to the WMO guidance on observations for numerical weather prediction (NWP), atmospheric humidity and temperature profiles at appropriate vertical and temporal resolution are among the most critical variables that are not adequately measured. However, sensor synergy may overcome limitations of currently available remote sensing tools and thus help meeting the NWP requirements.

I think this manuscript will address the problem above, and provide useful information on the potential synergy of two instruments commonly used for thermodynamical

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profiling, that are microwave radiometer (MWR) and Raman lidar (RL). In particular, the manuscript points out important features such as the negative effects caused by incorrect estimate of the instrument specification, such as the RL overlap function and measurement uncertainties. It is also interesting to see that the RL temperature information is not essential for the retrieval of relative humidity.

I have few comments that may help improving the manuscript:

- I feel that earlier work in the same direction (humidity profiling) but with different instruments is not properly acknowledged (e.g. Furumoto et al., 2003; Bianco et al., 2005). The authors may comment on the advantages offered by RL with respect to other instruments and approaches.

- the authors should comment on how reasonable is their assumption of no correlation between measurements in different heights (page 5479).

- Section 3.3 would benefit from the information on the used elevation angles (page 5479). This information is given much later.

References:

Bianco L., D. Cimini, F. S. Marzano, and R. Ware, 2005: Combining Microwave Radiometer and Wind Profiler Radar Measurements for High-Resolution Atmospheric Humidity Profiling. *J. Atmos. Oceanic Technol.*, 22, 949–965

Furumoto, J., M. Kurimoto, and T. Tsuda, 2003: Continuous observations of humidity profiles with the MU radar-RASS combined with GPS and radiosonde measurements. *J. Atmos. Oceanic Technol.*, 1, 23–41.

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