

Radar-radiometer based liquid water content retrievals - how the measurement setup influences retrieval uncertainties

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Abstract

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2 Weather and climate models still struggle in predicting cumulus and stratocumulus clouds accu-
3 rately, thus, these clouds are a major uncertainty sources when forecasting weather and projecting
4 climate scenarios. Well-known standards are necessary to evaluate models and to increase their pre-
5 diction skills. Such well-known standards can be represented by accurate measurements of cloud
6 processes and quantities, such as the distribution of liquid water content (LWC). Frisch et al. (1998)
7 combined radar and radiometer observations to estimate LWC profiles. Retrieval uncertainties are
8 introduced by both their model assumptions and the measurement setup. Assuming the former is
9 correct, we will discuss retrieval uncertainties arising from varied beam widths, temporal and vertical
10 resolutions, frequency combinations, and beam overlap of and between the two instruments. In par-
11 ticular, we will focus on how detecting passive and active signals over the same antenna, i.e. having
12 ideal beam overlap, increases the quality of derived LWC profiles.

13 Frisch, A. S., G. Feingold, C. W. Fairall, T. Uttal, and J. B. Snider, 1998: On cloud radar and
14 microwave radiometer measurements of stratus cloud liquid water profiles. *J. Geophys. Res.: Atmos.*,
15 103 (18), 23 195–23 197, doi:0148-0227/98/JD-01827509.00.