**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "An intercomparison of radar-based liquid cloud microphysics retrievals and implication for model evaluation studies" *by* D. Huang et al.

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Comment: General comments: The manuscript presents a comparison of different algorithms for deriving liquid water cloud properties from ground-based remote sensing observations. The major novelty of this study is the long-term monitoring over more than a decade for a constant observation site. It gives therefore a new insight to problems related to cloud remote sensing.

Response: We thank the reviewer for the valuable comments that help to improve this manuscript. Here are our detailed responses to the review comments.

Comment: However, the present manuscript lacks of conciseness in some parts and contains unnecessary repetitions of facts. Section 5 would need a more ïňĆuent writing, as it is currently mainly a sequence of ïňĄgure descriptions. Furthermore, the paper needs signiïňĄcant language (incl. grammar) editing. To sum up, I recommend publication only after major revisions. Some speciïňĄc comments which should be considered are listed below.

Response: We will re-organize sections 2-4, as also suggested by other reviewers. Sections 2, 3, and 4 will be merged and a table will be included to illustrate key inputs/assumptions for each retrieval algorithm.

To avoid repetition, we will keep only the monthly-mean comparisons. We will add comparisons of Contour Frequency Altitude Diagram (CFAD) and remove the PDF comparisons in the original manuscript. As a result, section 5 will be rewritten.

Comment: SpeciïňĄc comments: Please comment shortly at one place which instruments were needed to perform this study. Only the MMCR is mentioned in section 4. This section (4) could however be cancelled and incorporated into sections 2 and 3.

Response: We will merge sections 2-4 into one section. A more detailed description of instruments used to collect necessary observations for the retrieval algorithms will be added in the revision.

Comment: The intercomparison results lack completely from a statistics of cloud occurrence. What is the frequency of clouds in the annual cycle? How did the occurrence of clouds vary between the different years? And does all that have any effects on cloud statistics, presented in Figs. 1 and 2?

Response: We agree with the review that intercomparisons of cloud microphysics should be performed in context of cloud macrophysics (cloud occurrence etc.). We will add two figures describing the vertical distribution of clear/cloud occurrence.

Comment: Is the dependence of cloud occurrence with height different for the three

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algorithms? For this purpose PDF's of cloud occurrence vs. height would be benefi-cial (not only mean LWC for all clouds). Any different algorithm behavior in this context could also explain some of the discrepancies in the results. In addition error bars to show the variation of mean values could add some more information.

Response: We will add two figures describing the vertical distribution of clear/cloud occurrence. We have found that the inferred dependence of liquid cloud occurrence with height is different between the MICROBASE and UU retrievals. When only non-precipitating clouds are considered, the two retrievals show very similar vertical structure of liquid cloud occurrence.

The figures of mean LWC/re profiles will be replaced by CFADs of cloud LWC/re.

Comment: What is the purpose of Fig. 7 (autocorrelation plot)? This analysis does not give any additional information to this study. Please give a clear motivation for the plot or skip it.

Response: Figure 7 will be removed, as also suggested by the first two reviewers.

Comment: Fig. 10 b, c present cloud top and cloud base. How do the algorithms treat cases with more than one cloud layer?

Response: When more than one cloud layers are present, cloud base is the base of the lowest cloud layer and cloud top is the top of the highest cloud layer.

Comment: Technical corrections: As already stated above, the manuscript needs English language checking (spelling and grammar!). There are several native English speaking co-authors who should have read the manuscript more carefully before submitting.

Response: We will proof-read the manuscript carefully and improve the English with the help of co-authors.

Comment: Please try to get the whole manuscript shorter, writing more concise para-

graphs an avoiding repetition of facts! Please use the same range for all subplot axes with the same variable in Figs. 3, 5, and 8.

Response: We will re-organize several sections and condense the text. Section 5 will be rewritten because many related figures will be changed. We will use consistent ranges for all axes in the figures.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 7109, 2011.