

Interactive comment on “Radar-radiometer retrievals of cloud number concentration and dispersion parameter in marine stratocumulus” by J. Rémillard et al.

Anonymous Referee #1

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The method proposed is aimed at introducing more detailed cloud microphysics into retrievals from remote sensing data in stratocumulus. It is fairly restricted because of the need to eliminate situations with drizzle, and because many assumptions are of questionable validity on the scales on which it is here employed. The lack of in situ data in support, and constraint of, the assumptions is an added weakness.

page/line

7508/24 Please clarify what you mean by cloud scale when referring to Sc or St. Also, the reference to 'smaller' is made without clear indication of what is being compared.

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7509/8 What is the meaning of 'multi-synergistic'?

7513/6 This seems to be a misreading of the Miles et al. paper or ambiguity in the definition of the dispersion parameter referred to. In Fig. 5 of Miles et al. the dispersion is clearly seen as increasing with height.

7513/9-12 If sigma is constant with height and variations in N are small, the LWC would have to be nearly constant. Something wrong here.

7513/16 The intention in weighting by $Z^{0.5}$ seems to be to introduce some measure of mass (LWC). Why? What is the consequence of doing this? How well does it work when the PSD varies? Even though this is adapted from Frisch et al., the impact of this step on the application here developed deserves some examination.

7513/17 Why is this step called a retrieval and not just a rearrangement of the equation to solve for N.

7514/eq.10 Isn't this equation valid only if sigma is invariant with height?

7515/8 On what horizontal scales can the Korelev-Mazin assumption be applied? Are the results here obtained consistent with the assumption of the Korelev-Mazin theory?

7517/1-16 This paragraph seems to be running about in circles about drizzle presence with the lack of radar echo below cloud base as the only criterion being applied. How about the magnitudes of Z?

What explains the large range of values derived for N_{cl} both in the vertical and in the horizontal? No clear correlation is evident in the results between N_{cl} and updraft, so are we to assume that the the variations in N are the result of local variations in CCN? Is that a reasonable result? How does this variability in N_{cl} square with the statement on 7513/11-12?

Mixing seems to have been assumed to have no role in the cloud structure. If so, please state the limitations of that assumption. Again, there is a need to provide some

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explanation for both the observed and retrieved variations in all scales in terms of the model assumption.

If condensation and evaporation are assumed to form a reversible process cycle here, what accounts for the variations in LWP for regions with similar cloud depths?

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