

Interactive comment on “A Method for Computing the Three-Dimensional Radial Distribution Function of Cloud Particles from Holographic Images” by Michael L. Larsen and Raymond A. Shaw

Anonymous Referee #2

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I find little to argue with in this paper at least within its well-defined restricted domain. Potentially it offers a wonderful way of observing a very difficult but important quantity to measure in clouds, namely the radial pair correlation function using data in three dimensions. As far as I can tell, it is still not possible to measure the three dimensional pair correlation function. Nevertheless, this work still provides a potential path for measuring an important function and, as such, is worthy of publication.

There are places, however, where I would like to see the article strengthened, most notably near the end. While the authors find Fig.6 encouraging, I find it rather dis-

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couraging given the great uncertainty in $g(r)$ in the sub-millimeter radial distances. Is it even possible to really measure $g(r)$ in this range? What kind of position accuracy would be required to make such measurements and are they really achievable using aircraft observations? If it takes, say, 50 microseconds per hologram and an aircraft is flying at 100 m/s then the displacement between successive holograms would be 5 mm. If, say, as Fig.6 suggests, you would like on the order of 10 holograms, the aircraft would have moved 50 mm or 0.5 cm. How would that affect the calculated $g(r)$? You are certainly not looking at all the same particles so that the uncertainties would presumably increase. Along the same line, how many holograms do you think you would need to measure $g(r)$ to some desired degree of accuracy in the sub-millimeter range even if conditions were stationary? While Fig.6 illustrates the variability, the addition of a plot of the relative uncertainty would also be appreciated. Is the noise white?

As referenced in the paper, while others have made concentration measurements using the HOLODEC instrument, for example, it is a wholly more demanding challenge to measure $g(r)$ with reliable accuracy in actual clouds using aircraft measurements. This challenge should at least be acknowledged and discussed in this work as well as how this might be addressed in real world observations.

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