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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long-resident droplets at the stratocumulus top" *by* Alberto de Lozar and Lukas Muessle

Anonymous Referee #1

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The authors explored the hypothesis that some droplets reside longer at cloud top and grow larger due to radiative cooling, leading to a broadening in droplet size distributions in stratocumulus clouds. I find it very interesting and worth publishing for ACP if the minor concerns below are properly treated.

Concerns

1) Further explain required for the sentence in Lines 244-246. It is not clear why Re independency can be expected for high Re.

2) about Subsection 4.2: I understand that the authors distribute Lagrangian droplets at t=0, while residence-time counting started at t=6.6t*. Please specify how to set the initial (i.e., at t=0) positions of Lagrangian droplets. Are they initially uniformly distributed?

3) Correct the sentence in Line 334. The decay time actually increases for 0.6t*<t_res<0.9t* in Fig 3(b).

4) about Fig. 4: The authors explain "Long-resident droplets can be found everywhere but they clearly prefer the downdraft regions (Lines 360-361)". But I guess that all the droplets, including convective droplets, prefer the downdraft regions, which are horizontally converging regions. Please additionally show the distribution of convective droplets (short residence times) to prove that the preference is really only for long residence droplets. By the way, are there any green colors in the figure? I cannot find any.

5) about Fig 5: Not really clear why t=83min data is to be compared with the observation. For example, t=30min data does not really agree with the observation. I would suggest weakening the claims "a remarkable similitude between observations and simulations (Line 389)" and "The measured DSD matches almost perfectly our measurements for droplets around the mean size (Line 484 in Conclusion)".

Technical corrections:

1) Line 253: remove "x1 O x2".

2) Line 354: eddy hopping, not eddy hoping

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