

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2020-1314

Anonymous Referee #1

Referee comment on "A new conceptual model for adiabatic fog" by Felipe Toledo et al.,
 Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1314-RC1>, 2021

The authors present a conceptual model of fog water content profiles. They develop and evaluate it based on measurements, and use it to characterize fog life cycle stages.

Remarks

- line 1: Before you describe the details of the definition: Why is this new definition necessary?
 - 2: the extent is first defined from the surface up, but in the following sentences the direction is inverted. Please find a consistent direction. Shouldn't it be "extends towards the surface from a known upper boundary altitude"?
 - 2: saturated by what?
 - 17: would RLWP not be 0 by definition at dissipation?
- Abstract: The term 'adiabatic' fog is used here, and the assumption seems to be that fog has an adiabatic profile. This should be explicitly mentioned for clarity
- 68: What precisely is meant by "rule" in this sentence? What are macroscopic properties in this context?
 - 78: Why is opacity of a fog layer always linked to a well-mixed situation? Would you rule out the existence of an opaque sub-adiabatic fog layer? If so, why?
 - 87: You say "the surface limits vertical fog development". But radiation fog development starts at the surface, and continues upwards. The implication of your statement would be development in the opposite direction. Is this intended? I would hold that "excess LWC" at the ground surface is the result of continuing cooling, not of a truncation of the cloud base.
 - 93: Is this increase of LWC really always due to upwards motion of moisture, as you say, or could it also be upward movement of the cooling surface?
 - 240: In your observations, does α_{eq} scale with visibility at ground level?
 - 473: What do you mean by implementation "on LES"? Implement your model in the LES?
 - 477: While your findings/model are well backed up by the extensive data base of observations from the Paris region, to what extent do you expect your model to be applicable on other conditions? Can you comment on that, please?

Details and technicalities

- 1: For this purpose, fog is defined as...
- 21: water vapour saturation
- 21: 'cooling of air' or 'reduction of air temperature'
- various places: associated WITH
- 484: These sentences probably don't belong here :) If the thesis is available online or via libraries, a reference would be useful to the interested reader, however.