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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dissolved organic carbon (DOC) and select aldehydes in cloud and fog water: the role of the aqueous phase in impacting trace gas budgets" *by* B. Ervens et al.

Anonymous Referee #1

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Review: Ervens et al. 'Dissolved organic carbon (DOC) and select aldehydes in cloud and fog water: the role of the aqueous phase in impacting trace gas budgets'

General: A reasonable study comparing model result with sophisticated field measurement result. I would like to recommend several changes and additions to make the comparison between model and measurements more clear. Of course there are ways to determine cloud interaction times and the manuscript should be strengthened in this regard. All of this corresponds to a major revision.

The main effect discussed, a decrease of gas phase HO2 formation due to phase separation of aldehydes, turns out to be small.

In the title "select aldehydes" could be changed to "selected aldehydes" or just "some aldehydes".

Details

Page 33092, section 3.2: The box model description is insufficient and should be substantiated. I have mentioned this already as a separate first comment and hoped for a fast (interactive) response by the authors. Please address this comment thoroughly. Please note that the mechanism cited here as Ervens et al. (2004) without naming it is generally addressed as CAPRAM 2.4 (MODAC mechanism) as it was developed in a multi-partner EC project named MODAC.

Page 33088, line 10 ff: I think this should be formulated much more carefully, not all aldehydes are fully hydrated in aqueous solution. This should be mentioned and referenced. So, this particular difference will be largest for HCHO.

Page 33104, section4: I have problems with application of the box model. Have there been tracer experiments being performed to come to cloud interaction times ? The authors are now using the interaction time as a variable but it would be more interesting to see how the box model results behave when air-cloud interaction times are used which are realistic at the different station. I would like to suggest to get best guesses of these interaction times, draw them into Figure 5. The LWC is now just represented as a line , not a range. Better mark it as a range. Then, mark the best available interaction time interval also as a range. Discuss the model results in that area where both ranges cross and compare them with the measurements. This would add much clarity to the discussion of the box model results. Other field measurement saw enormous enrichment of carbonyl compounds in the aqueous phase. At present, it cannot be judged from this manuscript if something similar happened here. Please discuss.

Page 33109 /110 Please check the conclusion section for consistency. On the last page it says the effect is small. The last sentence then states a "significant impact" suggested by "these studies" - which ones ? This is confusing.

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Interactive Comment

The statement that the results of this work "...are robust" is axiomatic and needs substantiation.

The statement "..the box model simulations ...might not fully quantitative..." is not adequate - The status as described is different in my view: The authors need to prove that the model at all relates to the observations.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 33083, 2012.

ACPD

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Interactive Comment