

Interactive comment on “On the effects of hydrocarbon and sulphur-containing compounds on the CCN activation of combustion particles” by A. Petzold et al.

Anonymous Referee #1

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This paper analyzes the effect of non-volatile OC and sulfur-containing compounds on the CCN activation of combustion particles. The results are as expected from laboratory studies of the coating of partially soluble organic aerosols with sulfate or sea salt. For someone not directly working in the area of air traffic emissions, the significance of the results presented here is not obvious. How often and significantly do aircraft emissions influence the microphysics of water clouds? Is that relevant or is that negligible as compared to their impact on cirrus clouds? If the latter, why did you conduct this study? This needs to be emphasized in the introduction. Also, it has to be clearly stated what is new in this study that wasn't discussed in previous papers from the PartEmis project.

Overall the paper is suited for ACP and I recommend publication after the questions above and below have been addressed.

Detailed comments/questions:

page 2607, lines 14ff: Is size really that unimportant for CCN activation as stated here? Couldn't you just separate size effects from the OC/EC partitioning in your estimates and be more definite about the importance of each?

page 2608, line 6: Please explain chemisorbed.

page 2608, line 20/21: Why is $\epsilon > 1\%$ a criterion that's mentioned to explain that more than 90% of the S(VI) remains in the gas phase. How does the percentage of S(VI) in the gas phase vary with ϵ ?

page 2612: N₂₀ is used but never explained

page 2616, line 19: Shouldn't it be 20% rather than 15%

page 2618, lines 2ff: Do you have any explanation for your discrepancy to the Corrigan and Novakov results?

page 2618, lines 8ff: How can the organic fraction increase the water absorption?

Table 3: Why do you have a lower EC/TC ratio for modern aircraft? Shouldn't the higher temperatures in modern aircraft lead to a higher EC/TC ratio?

Table 5: Why do you have two entries for H₂SO₄ coated with $\epsilon=0.8$ and two entries for $\epsilon=1.2$? What is the difference between the two?

Figure 4: Please use the same y-axis for the old and new cruise conditions. Also, I suggest using temperature as the x-axis.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 2599, 2005.

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