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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the influence of fuel sulfur induced stable negative ion formation on the total concentration of ions emitted by an aircraft gas turbine engine: comparison of model and experiment" *by* A. Sorokin et al.

Anonymous Referee #3

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The paper presents model studies on the formation and evolution of stable combustion ions in an aircraft engine combustor. The electron detachment efficiency is introduced as a free model parameter in order to simulate the fuel-sulphur induced production of stable sulphur-containing negative ions. However, since no information on the expected magnitude of this parameter is available, a parameter study on a wide range of values is performed and analysed. A comparison of modelled ion concentrations with observations is presented and good agreement is claimed.

As a general statement I do not recommend the paper for publication in ACP in its current version. The only scientifically new aspect of this paper is the introduction

of a free model parameter into an existing model without increasing the insight into underlying physical processes. The main conclusion of the paper, however, is almost trivial: since most of the negative ions in the exhaust of an aircraft engine are composed of sulphur-containing compounds (as is shown e.g., by Kiendler et al., Atmos Environ. 34, 2623, 2000), an increase in the fuel sulphur content should result in an increase in the ion concentration in the exhaust.

The description of the model and particularly of the experimental data used for comparison is not sufficient, so that the reader cannot follow the arguments without using other sources for information. Particularly the quality of experimental data including error bars is not discussed. Furthermore, the experimental conditions used during the experiment PartEmis are not properly described, because the conditions where the combustor was operated on different fuel flows were mainly designed to vary the combustion conditions with respect to pressure and temperature. A discussion of the influence of these combustion conditions on the formation of chemi-ions is totally missed.

It is not clear whether the differences between the model and experimental data are within or without the range of uncertainty. To my impression, the interpretation of modelled data compared to the experimental data used for verification is overrated. Above all, this holds for the time dependence of the discussed processes. All shown experimental data are at the very end of the time axis of all discussed processes. No confirmation of the time dependence of the assumed processes is possible.

I do not see a benefit from separating this small study from the presentation of experimental data. To my opinion, the presented material is not sufficient for a stand-alone paper on this subject.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 6001, 2003.

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Interactive Comment