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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 #4

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Experimental data, as quoted in this paper, has shown a correlation between fuel sulfur content and an increase in positive and negative ion concentration at an aircraft combustor exit. The experimental data was also found to be dependent on the fuel flow into the combustor. It was proposed that the formation of stable sulfur containing negative ions could account for these observations. This paper has attempted to verify this proposal via a very simplified and parameterized model simulation of the combustor ion chemistry.

The model calculations include chemical reactions within the reactor that are based on estimated gas phase concentrations of both neutral and ion species. These calcula-

tions are used to mimic the experimental observations at the combustor exit. The value of this approach is primarily to demonstrate the feasibility of the proposed/observed dependence of fuel sulfur content.

In my opinion, however, the paper does not present the model calculations properly. The authors have somewhat misrepresented their ability to model the combustor ion chemistry with an over parameterized model input. Basically, the model was setup to yield agreement with the experimental observations. This is of value because it demonstrates the feasibility of the proposed chemistry but it does not provide the predictive power that one would want from such a model.

I found this paper to be supportive of the proposal that increased fuel sulfur content influences the ion concentrations at the combustor exit. This result is worth publication to demonstrate the feasibility of the proposed mechanism. However, I would recommend a significant revision of the paper to present the work in the proper perspective before publication. The focus should be on a possible (not necessarily unique) interpretation of the experimental observations not a comprehensive model. Also, seeing that this interpretation has already been proposed, the authors need to focus on presenting something new.

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