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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Suppression of chlorine activation on aviation-produced volatile particles" *by* S. K. Meilinger et al.

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1) Referee 1 states that we do not properly distinct between warm midlatitude chemistry that affects ozone via transport and cold polar chemistry in our introduction. We think the reviewer is basically correct and try to avoid confusion by changing p.985 l.5-13 in the introduction as follows:

"Global model calculations suggest the additional heterogeneous chemistry in the perturbed aerosol layer to have a net O_3 depleting effect, with the highest values predicted north of the NAFC (Weisenstein et al., 1998; Pitari et al., 2001). These calculations (Weisenstein et al., 1998) indicate that the ozone depleting effect of aircraft particle emissions depends on temperature (T) and on the size and number densities of the emitted particles at plume breakup (time τ after which the plume can be considered a regional scale perturbation)."

2) Referee 1 raised a concern about the validity of the employed parameterization by Kärcher and Meilinger (1998). The conclusions of Kärcher and Meilinger (1998) are still valid.

Kärcher and Meilinger (1998) use the background aerosol surface area density A_b as a parameter. The quoted range 0.03–20% comes from the variability according to observations that do not include the cold temperatures and the associated larger variability $A_a(\tau)/A_b$ due to additional HNO_3 uptake. The parameterization scheme, however, can still be employed to include these cases by considering high values of A_b, as calculated. (Note that Kärcher and Meilinger (1998) also address volcanic perturbations with even larger A_b that override any aircraft-induced signal). To clarify this, we introduce the following changes in chapter 3.1 (p.988 l.10 - 13):

"The magnitude of this perturbation is mainly determined by the surface area density of the background aerosols which scavenge the smaller aircraft particles. The above range of perturbations has been determined for average temperatures at the tropopause and does not include very cold cases, in which the associated variability could be larger, as shown below. The coagulation efficiency becomes strongly enhanced ..."

3) Referee 1 suggests, that the recommendations for global modellers should also contain a statement about the uptake process on ice surfaces (presumably such as HNO_3, HCl...). We fully agree and added corresponding notes at several places in the manuscript.

In chapter 2, p.987 l.3: "... and ice particles. For heterogeneous halogen and N_2O_5 chemistry we assumed the uptake coefficients evaluated for polar stratospheric clouds (Sander et al., 2000) to be applicable to tropopause conditions. The liquid particles are..."

In chapter 3.4, p.991, l.2: "Recall that we assume the uptake coefficients involving ice surfaces according to (Sander et al., 2000) in our model to be applicable to tropopause

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conditions."

In the conclusions, p.991 l.26: "... magnitude, provided the heterogeneous reaction rates validated for stratospheric conditions can be applied to ice particles at subsonic cruising altitudes."

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 983, 2002.

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