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

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For referee 2 it sometimes remained unclear whether impacts of sub or supersonics are being referred to.

We refere in all results shown in the paper to subsonics flying in the stratospheric part of the NAFC (see p. 986 l. 11ff). The microphysical mechanisms at work are found to be similar for future supersonics (see p. 992 l. 6ff) as documented in the research report No. 29541814 of the German Umweltbundesamt. Therefore the suggested parameterisation should hold for the entire lower stratosphere for subsonic as well as supersonic aircraft.

ad 1) p. 984 l. 1: "nanometer-sized"

ad 2) p. 984 l. 17: "and reductions in ozone levels. These features..."

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ad 3) p. 985 l. 26ff:
"Furthermore, the Kelvin effect limits the solubility of H_2O and HNO_3 and thus the growth of the small aircraft particles compared to the background aerosols ($|dA_a/dT| < |dA_b/dT|$). In addition, the particle size dependence of coagulation scavenging leads to increasing scavenging losses of aircraft particles as background aerosols grow more readily in cooling air masses."

ad 4) p. 986 l. 14:
"...(IPCC, Chapter 3, pp 65-120, 1999)"

ad 5)
We added the necessary reference to the heterogeneous reaction rates (p. 987 l. 3):
"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."

ad 6)
In our study, we used η=5%. Values for η smaller or higher than 5% (0.5-10%) will decrease or increase $A_a(\tau)/A_b$ =1-15% according to Fig.2b in Kärcher and Meilinger (1998). Values of η outside this range appear to be rather unlikely (Kärcher et al., 2000)." In the paper, we added the missing information on p. 987 l. 14:
"...the conversion of fuel sulfur into ultrafine sulfate particles (η=5%)..."

ad 7) p. 987 l. 24:
"...reactants..."

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ad 8) p. 991 l. 22:
"Therefore, additional chlorine..."

ad 9)
Again it seems to remain unclear where we refer to subsonic airtraffic in the lowermost stratospheric part of the NAFC and where we refere to a future supersonic fleet.
The first paragraph of "Conclusions" clearly refers to the results presented in this paper assuming subsonic airtraffic in the lowermost stratospheric part of the NAFC. To clarify this, we replaced p. 991 l. 13 "aircraft-induced" ->"subsonic aircraft-induced". In the fourth paragraph, however, we refer to similar calculations, which show that the described mechanisms also work for a future supersonic fleet, now citing our research report to the German Umweltbundesamt (p.992, l.6: "Similar calculations (UBA, 2000)..."). We also changed the reference list accordingly (p. 995, l. 8: "UBA (Umweltbundesamt), Forschungsbericht 29541814 (Luftreinhaltung), "Auswirkungen der Emissionenen des Luftverkehrs oberhalb der Tropopause auf die stratosphärische Ozonschicht (ALTO)", Mai 2000.") The end of this paragraph deals with the possible consequences for global model calculations of future supersonic airtraffic such as Weisenstein et al., 1998. The last sentence just states, that there is not only a heterogeneous effect of liquid aircraft emitted particles, but also the possiblity of contrail-induced clouds. However, this aspect might fit better in the next paragraph.

ad 10)
For clarification, we slightly modified the last paragraph: p. 992 l. 16ff:
" ...(Kawa et al, 1999). At moderate and high temperatures the aviation-induced suface area increase (up to about a factor of two in supersonic flight corridors; Kärcher and Meilinger, 1998) would indeed considerably affect heterogeneous chemistry. However, under cold conditions such as the winter polar stratosphere, scavenging and Kelvin effect limit the chemistry on aviation-produced liquid aerosols. On the other hand,

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contrails may develop into long-lived polar stratospheric clouds (likewise not yet being considered in global assessment studies), which might enhanced chlorine activation (Peter et al., 1991). The overall effect should be subject to future global assessments."

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