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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Chinese $SO_2$ pollution over Europe – Part 1: Airborne trace gas measurements and source identification by particle dispersion model simulations" *by* V. Fiedler et al.

**V. Fiedler et al.**

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## Author response to referee #3

First of all we would like to thank referee #3 for the helpful instructions and comments. All comments will be taken into account for a revised version of the paper. Our point by point answers:

- The mission will be connected to INTEX-B and the paper from Singh et al., which

has been published after the submission of our manuscript, will be cited in the new paper version.

- The low RH in the plume may be an indication that the plume experienced cloud element precipitation. If so, this may imply that HNO3 and possibly also SO2 experienced loss. However, model studies indicate that most SO2 will survive transport and will reach the upper troposphere (e.g. Kreidenweis et al. 1997, Crutzen et al. 2000).
- The possible SO2/NOy ratio change will be explained more thoroughly. The washout coefficient of SO2 by rain is $2.6 \times 10^{-5} s^{-1}$ times the rate of rainfall (mm/h) (e.g. Martin 1984). HNO3 on the contrary will be completely removed by rain.
- Figure 10 and the description of the figure have been changed. We added a FLEXPART spectrum which shows the relative contributions of different continents to the expected SO2.
- Table 1 now also includes values for the background atmosphere.
- Table 2 has been changed. For comparison SO2/NOx ratios from other regions derived from the EDGAR inventory 2000 have been added.
- All technical comments are applied as well.

Crutzen, P.J. and Lawrence, M.G., The Impact of Precipitation Scavenging on the Transport of Trace Gases: A 3-Dimensional Model Sensitivity Study, J. Atmos. Chem., 37, 81-112, 2000.

Kreidenweis, S.M. and Zhang, Y. and Taylor, G.R., The effects of clouds on aerosol and chemical species production and distribution 2. Chemistry model description and



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Martin, A., Estimated Washout Coefficients for Sulphur Dioxide, Nitric Oxide, Nitrogen Dioxide and Ozone, Atmos. Environ., 18, 1955-1961, 1984.

Singh, H.B. and Brune, W.H. and Crawford, J.H. and Flocke, F. and Jacob, D.J., Chemistry and transport of pollution over the Gulf of Mexico and the Pacific: Spring 2006 INTEX-B Campaign overview and first results, Atmos. Chem. Phys. Disc., 9, 363-409, 2009.



**ACPD**

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