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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.

Anonymous Referee #3

Received and published: 9 February 2009

This paper presents observations of a high concentration SO2 plume over Europe that FLEXPART model calculations indicate originated from Asia. This appears to be a unique observation, however I feel additional analysis should be done to strengthen the arguments for its origin. I think this paper could be worth publishing after addressing the comments below.

Specific comments

Clarify in the abstract and Section 2.1 that the flights were part of INTEX-B (not INTEX).

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Interactive Discussion

Discussion Paper

Reference can be made to the overview paper by Singh et al recently published in ACPD.

Section 3: What is the significance of the low RH in the plume? Perhaps the low NOy values compared to "typical" values is due to washout of HNO3?

A better estimate of how the SO2/NOy ratio will change with time should be given. SO2 and HNO3 will both be removed by washout (what is the difference between 'wet cloud processes' and 'in-could processes'?) – what are their relative washout rates? The thermal degradation of PAN to NOx is not a loss of NOy (NOx is still counted in NOy). SO2 is additionally converted to H2SO4 and sulfate, so if washout is equal the ratio will decrease, but this should be explained more thoroughly.

Section 4: I found the description of Figure 10 confusing. I would describe it as showing the age spectrum, or the contributions of air masses with different ages to the total SO2. Perhaps there is a slight error in time or location in FLEXPART and the measured plume A actually corresponds to the slightly earlier FLEXPART plume that includes contributions from significantly fresher pollution. Table 3 indicates Europe and China have similar SO2/NOx emission ratios. It seems possible to me that perhaps this plume had a closer source. A similar plot showing the relative contributions of different source locations to the total SO2 could be quite illuminating. How much does N. America and Europe contribute along this flight track?

Table 1: This table might be more useful if values were also given for background values and other plumes.

Table 2: It would be helpful to have these values for other regions (and include Table 3 in this).

Technical comments p.1379, lines 21-22: instead of "in westerly direction ..." I would say "from west to east has rarely been measured ..."

p.1380, line 5: identify which province Sudbury is in.

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Interactive Comment

p.1380, line 17: is 'permanent' the appropriate word? Do you mean continuous?

p.1383 and Figure 2: Why is the data smoothed with a running mean? If the data are noisy then data should be binned to 30s averages, instead of a running mean.

p.1383, ln 16: 'preferably' isn't the right word here (and elsewhere). 'primarily' would be better.

p.1383, ln 20-21: 'plotted' instead of 'scaled'

p.1384, ln 18: The emissions were made for INTEX-B

p.1385, ln 18: 'did come' -> 'came'; ln 20: 'preferably' -> primarily

Fig.1: Is a higher quality image possible? Add a color bar for the altitude. The 2nd sentence of the caption doesn't make sense to me.

Fig.6: Explain in the caption the 10 numbers printed on the plots.

Fig.7: Include a colorbar for the emissions.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 1377, 2009.

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