

Interactive  
Comment

## ***Interactive comment on “Analysis of aircraft and satellite measurements from the intercontinental chemical transport experiment (INTEX-B) to quantify long-range transport of East Asian Sulfur to Canada” by et al.***

et al.

Received and published: 16 May 2008

The use of INTEX-B aircraft data is indeed an essential element of this study. Major conclusions for the aircraft include the pronounced sulfate enhancements and the lack of organic enhancements in the free troposphere. Simulation results are used to both interpret this data and also provide an assessment of model accuracy. We have endeavoured to make this more apparent. We have updated GEOS-Chem emissions to include a new inventory over Canada, thereby reducing the model bias and providing confidence in its usefulness to interpret Cessna aircraft measurements. We also now show comparisons between DC-8 SO<sub>x</sub> and simulated values, which demonstrate

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



that SO<sub>x</sub> transport is well represented. Each of these comparisons is accompanied by quantitative comparison in the form of RMSD and mean bias, without which it is not possible to establish model accuracy, which would reduce the robustness of subsequent conclusions.

1. Thank you for this observation. The agreement between SO<sub>x</sub> emission growth as inferred by the satellite-model AOD difference with bottom-up estimates increases confidence in both methods, and provides evidence of their accuracy.

2. We now note that the more even spread of simulated AOD reflects the emission distribution for the year 2000. We clarified that simulated AOD includes all major aerosols including BC/OC and describe the dominant relative contribution of SO<sub>4</sub> to simulated AOD during the months used to infer SO<sub>x</sub> trends. As noted in our discussion of Figure 4, we found little evidence of organic long-range transport during our aircraft measurements.

3. We now cite McKendry et al. (2001), who found that a combination of plume subsidence and mountain-induced mixing processes facilitate interaction between long-range transport and the planetary boundary layer over southern British Columbia.

4. Figure 6 now shows SO<sub>x</sub> comparisons with DC-8 measurements to make clearer the agreement between simulated and measured values during INTEX-B. We also now include updated Canadian emissions in our simulations, thereby removing the simulated bias against Cessna measurements. Figure 6, 7 and 9 are essential to this manuscript as they provide an assessment of the model's vertical structure and are used to estimate model error. They also provide evidence that the model performed similarly in both INTEX-B and during the 1985 flights, thereby supporting long term trend analysis. Discussion of Figure 9 is now more closely tied to Figure 8, and we include quantitative analysis of the improvement resultant from mean comparisons.

Discrepancy between observation and GEOS-Chem - As speculated in the original submission, this bias has now been substantially reduced through the inclusion of

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

updated emissions over Canada. Where possible, SO<sub>x</sub> comparisons are now made against aircraft measurements to make evident the role of SO<sub>2</sub> oxidation in the remaining bias. Quantitative analysis of the effects of instrument size cut-off and modelled oxidation rates are provided.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 4017, 2008.

ACPD

8, S2762–S2764, 2008

---

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

S2764

