Atmos. Chem. Phys. Discuss., 10, C295–C298, 2010
www.atmos-chem-phys-discuss.net/10/C295/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Hydrochlorofluorocarbon and hydrofluorocarbon emissions in East Asia determined by inverse modeling" *by* A. Stohl et al.

Anonymous Referee #1

Received and published: 1 March 2010

This study presents estimates of halocarbon emissions (HCFC-22, HCFC-141b, HCFC-142b, and HFC-23, HFC-134a, HFC-152a) for the year 2008 from five East Asian Countries, namely China, North Korea, South Korea, Japan and Taiwan. The national estimates are derived using an analytical inverse method, which is based on an inversion algorithm, the Lagrangian particle dispersion model FLEXPART, in-situ measurements of halocarbon mixing ratios, and background information from several sources (e.g. available emission inventories, consumption data and population database).

These gases (HCFC, HFC), use in replacement of CFCs as required by the Montreal protocol, can become increasingly abundant in the atmosphere, and are important for the radiative forcing of Climate. In particular, they need to be monitored in those re-

gions, such as East Asia, which are characterized by a recent rapid economic development. Due to the lack of emission information, HCFCs and HFCs emission estimates can be very uncertain for some of these Countries. This work provides a better insight of their regional estimates, as it presents national total emission together with a view of the spatial distribution of the major sources. The latter is in line with the current knowledge of the main halocarbon production plants location.

The paper is very well written and structured. I recommend its publication, subject to the minor specific comments suggested below.

Specific comments:

1. P4 L124: How are the 'outliers' defined?

2. P5 L136: In this current set-up (e.g. reference scenario as in 2.4), what is the magnitude of the negative emissions, and what is their percentage with respect to the non-negative ones?

3. P6 L165: Could the authors explain how the inversion method will correct the errors introduced by using the consumption data?

4. P6 L185: Emissions due to import of foreign cars: why do the authors assume a third of the total emissions?

5. P6 L198: Emission flux uncertainties. Why do the authors choose these values (50% or 100% of the global mean emission flux)? How is the uncertainty of the prior emission fluxes distributed?

6. P7 Section 2.4: Uncertainties. The explanation of the 18 inversions would benefit from the introduction of a table.

7. P8 L238: $r_a^2 = 0.43$: I don't think this one is a good correlation.

8. P8 L239: Do the authors have an explanation for the low correlation values obtained for the Gosan site?

9. P10 L311: Robustness of the inversion results. Did the authors perform this analysis (e.g. retrieving emissions with sets of three stations) also for the national total emission of other East Asian Countries?
Rather than robustness, I would say that the Chinese emissions can be well constrained by a combination of three out of the four stations used for the inversion. It would be very interesting to compare the sensitivities/footprint resulting by the different three stations groups and analyze their features. Have the authors already performed similar studies?

10. P13 L420: 'automobile air conditioners account for two only thirds of total HFC-134a..'. Where is this estimate taken from?

Technical corrections:

1. P4 L94: detecor-> detector?

2. Figures 3 and 4: the inclusion of the major cities location would be helpful for the

discussions in section 3.2 (Emission patterns).

3. P10 L338: σ_b -> σ_a

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 2089, 2010.