Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-632-AC4, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Carbon dioxide emissions in Northern China based on atmospheric observations from 2005 to 2009" *by* Archana Dayalu et al.

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Received and published: 18 December 2018

An editorial comment expanded upon the referee comments, raising the issue that it may not be appropriate to use the L_0.90 region for optimization. The point raised was that the footprints would be diffuse, and that it was unlikely that fluxes would be constrained so far from a single site with significant confidence. It was further pointed out that in an inverse modeling approach there would be areas of significant uncertainty reduction over the prior.

As we have stated in detail to our responses to the referees as well as in the original and revised versions of the manuscript, we certainly agree that a single site is a study

limitation and we have caveated the study accordingly. This actually leads to our statement on P13 L8 where we justify our optimization approach (i.e., not using an inverse model): "Without a sufficiently dense network of high temporal resolution observations, full-scale inverse modeling approach to inventory optimization is inappropriate."

In terms of the optimization region itself, reduction of the optimization region (e.g., to the L_0.50 region) doesn't help matters and would lead to an increase in uncertainty what was ascribed to be "global" background versus air significantly interacting with the region. In particular, the modeled background would still be at the modeled 7-day back-trajectory extent. As a result, optimization of seasonal fluxes in L_0.50 would actually be concentrating the correction factor in a smaller region (40% of modeled influence would not be addressed; and other sources of uncertainty enter at that point). Choosing the L_0.90 region is actually a more conservative approach, where the seasonal flux corrections in additive mass units are diffused over a larger area.

The main issue of course continues to remain the single measurement site. But as we note in our responses to the referee comments, we find the reviews do not quite recognize the difficulty in obtaining observational data from areas where access is limited for various reasons and the value of conducting appropriate analyses based on the best available data. We feel the value of this study is in demonstrating a quantitative approach for using long time-series concentration data as a constraint on emissions inventories; some inventories emerge as being more consistent with observations. By demonstrating our approach, we hope the work will stimulate additional efforts to expand the observational network.

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