

Interactive comment on “Anthropogenic carbon dioxide source areas observed from space: assessment of regional enhancements and trends” by O. Schneising et al.

Anonymous Referee #1

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1 General Comments

The paper analyses SCIAMACHY XCO₂ data from 2003–2009 over a small selection of urban regions to quantify the associated regional emissions and how they change with time. They make a strong link between this analysis and the potential of the CarbonSat, which is a mission currently being considered for Earth Explorer 8. The study is interesting but the propaganda undertone of the paper is not useful unless the authors clearly explain how CarbonSat would improve on the results from SCIAMACHY presented here. I don't agree wholeheartedly with all statements made in the paper or some of the analysis but it is useful piece of work that should be considered for ACP.

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In general this reader would appreciate larger figures and/or larger fonts.

2 Specific comments

Page 31510, line 17. Comment: if SCIAMACHY was in a geostationary orbit and after subtracting the background variability I suspect you would also see natural variability within the metropolitan area. For instance, in situ work over the Paris metropolitan area has shown that vegetation can impose variability on the city-scale signals. The simple-minded approach described in this paper works only for reasonably homogeneous (i.e. sprawling) urban areas such as Los Angeles. For most cities a more complicated analysis is required.

Page 31511, line 21. It would be useful to show the comparison between SCIAMACHY and NOAA in situ data. I appreciate the authors have showed this previously but a simple additional curve to Figure 1 would be appreciated by this reader - both for the CO₂ time series and the CO₂ residual after the growth rate has been removed. How did the authors separate the growth rate from the original time series?

Page 31512, line 5. It would be useful if this reader understood the justification for choosing these sites. Are they the biggest emitters? Are they contrasting regions? Are these the regions with the best agreement between SCIAMACHY and EDGAR?

Page 31512, line 15. This reader particular abhors vacuous statements such as “as can be seen [insert name of data A] correlates reasonably well with [insert name of data B].” No, I cannot see the correlation - I can certainly guess what it is but it would clearer if the authors provided these values. There is some agreement in the broad spatial distribution but there are many instances where the emission inventory shows large enhancements associated with urban activity and SCIAMACHY does not observe any significant enhancement. As the authors note this is likely due to atmospheric transport and vertical mixing. To interpret these space-borne data correctly a 3-d atmospheric

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transport model is required, which I think needs to be fully acknowledged.

Re EDGAR: these emissions are likely to be accurate qualitatively, but have substantial quantitative error for any one year.

Section 3.2.1: I would like clarification that the GEMS model is being sampled at the time and location of the SCIAMACHY measurements.

Conclusions: The first paragraph is a little strong in my opinion. I don't think based on the work reported that the authors have unequivocally shown that are observing anthropogenic emissions. They have certainly not shown this is generally true. I am uncomfortable that the authors are using this analysis to advertise a completely new mission that has not been shown to provide information on the spatial scale of individual power plants.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 31507, 2012.

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