

Interactive comment on “Inverse modeling of Texas NO_x emissions using space-based and ground-based NO₂ observations” by W. Tang et al.

Anonymous Referee #1

Received and published: 20 August 2013

This manuscript a well-written and clear description of an application of an inverse modeling technique for evaluating emissions inventory of NO_x using satellites and ground-based measurements. This study builds on the previous of its kind and analyzes an application to a region covering Texas.

Some specific questions:

1) The comparison of the AQS inversion to the satellite inversion needs more discussion, particularly the diurnal variability in the ground measurements and the spatial distribution of the sites themselves. This context will probably help to explain the difference in the inversion results. In my opinion, this is the most significant finding of the study and definitely needs more attention.

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2) I am not sure that devoting space in the manuscript to the scaling inversion is warranted. The authors state compelling reasons for why it is not appropriate for this case. This is then confirmed by the application. Perhaps, it's enough to explain why it is not appropriate and then just state that the authors tried it and it failed. I am not sure much is gained from actually showing the results and the accompanying discussion.

3) Perhaps more justification or at least discussion of the “additional NO_x emissions” might be helpful. For example, it might helpful to include some tables comparing domain-wide emissions totals for the various sources and compare those to “lightning” and “biogenic” to show bulk impacts of your changes on the troposphere. Since more rural regions require larger scaling in the satellite inversion, perhaps, these additions are still not sufficient.

4) Table 1 could probably be shown as part of the legend of Figure 3a or not at all, because the figure kind of shows the scaling.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 17479, 2013.

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