

Interactive comment on “Detection from space of a reduction in anthropogenic emissions of nitrogen oxides during the Chinese economic downturn” by J.-T. Lin and M. B. McElroy

Anonymous Referee #2

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The manuscript of Lin and McElroy describes retrievals of satellite data over China and their use to estimate emission data. This is a well established technique, as the long citation list shows. Anyhow, they use satellite data to get further detailed information on the effect of the economic downturn in China in 2008. The authors showed, that the decrease of emissions was partly overlay be the decrease due to the Chinese Spring Festival.

The first part of the manuscript is well written, the second parts needs major revisions. The authors use data of five different satellites. In the second part of the article the reader gets the impression the authors got lost in the amount of data. It was extremely

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difficult to follow their descriptions, especially in section 5.2.2.

The red line is missing in the second part. I strongly recommend to reorder the manuscript to avoid a mixing of technical details with results. Start with technical information on retrieval, model description, and the estimate of emission data. You may separate the impact of the economic downturn from influences of CNY on emissions and VRD. Clarify the double impact early in your paper.

The curves in the different figures are described in details, explanations of differences are mainly missing, as well as the interpretation of the data. Add a paragraph on the impact of meteorological parameters and how they are used for the calculation of emission data. You have to show some results of Rm. Anyhow, the results differ a lot from measured VCDs. Following your explanation, you have used an old model version. I strongly recommended to repeat the simulation with an updated model. At least indicate an possible impact on your results.

Sect. 4.2.1

Page 202, line 13: Maximum in winter: A long discussion is given in Zhang et al (2007), which is not cited in this context.

Sect. 4.2.2

Fig 2b: What is the reason for the time shift in max VCDs and TPG in 2008?

Sect. 5.1

P 203, L 23-25: Numbers for decrease and increase in TPG differ from page 200, line 18-20. It is the 3rd repeat of these numbers. You may skip line 22-25 P203.

P204, L 8: The early date of CNY in 2009 is used to divide downturn by CNY and economics. This could be mentioned here.

Sect 5.2.1

Split the model description line 2 to 19

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Why are identified errors still in the used model code? Why the updated N₂O₅ uptake rate is not used? To repeat the simulation in order to get better comparable results would strengthen the paper.

Sect. 5.2.2.

This section remains unclear to me, even after reading it more than once. Sort your arguments and differ between retrieval data, model results and emission data. This section has to be rewritten, explanations to be included, not only descriptions of up and downs in the curves. Fig 3 is crowded and not readable in the small size given by ACPD. Split curves.

Clarify how you calculate the emissions, e.g include a figure. At the moment, the function of the model remains unclear and the results are not used to explain your data. Table with description of simulations?

Table with description of emissions?

P 205, L 27: Why decrease from 2005 to 2006?

P 206, L 21 Show results of rm in a figure.

P 207, L 1: Change of ??? Interannually changes? Changes in Jan data?

P 207, L 3-4: Changes reflect met. conditions? Blue line shows change in met condition. Red line is strongly influenced by the amount of valid retrieval data. Rm equal to red or blue line?

Why differences between blue and green line? What does this mean for retrieval results? Please, give an explanation for the maximum values in 2008 without increasing emissions (Sciamachy).

P 207, L 18-26: Move the paragraph

Figures:

Increase the font size

Fig. 3:

It is almost impossible to see anything.

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Separate model results, sat. data and emission data.

Increase the figure, split the curves, e.g. 1. to 4 and 5 to 8

Legend is not linked to the text. What means e.g. 'Emis w.r.t. 4 1'?

Better legend which describes the lines!

Skip GOME-2 results? Then you can enlarge you single figures.

Fig. 5:

Year 2009 is missing

Unit?

Difficult to divide light blue and grey.

Caption: '... See text...' add section here.

Very large values over the ocean. Why?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 193, 2011.

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