Atmospheric
Chemistry
and Physics
Discussions

Open Access

EGU

ACPD

Interactive
comment

Interactive comment on "Source regions contributing to excess reactive nitrogen deposition in the Greater Yellowstone Area (GYA) of the United States" *by* Rui Zhang et al.

Anonymous Referee #1

Received and published: 25 May 2018

General comments

This manuscript reports on a modelling study, whereby the source sectors and regions of reactive nitrogen (Nr) are determined for the Greater Yellowstone Area in the United States. The model was evaluated thoroughly, and then used for quantifying source contributions to Nr deposition via a tagged model method. Agriculture from the Snake River Valley was determined to be the largest source. They took model error into account by doing a sensitivity study to give approximate uncertainties on the source contributions. This study represents new work as there is a lack of source attribution studies for Nr deposition for this region, however, I feel that they could emphasize

Printer-friendly version

Discussion paper

further how their study is new, different, and important compared to previous studies. Specific and technical comments below.

Specific comments

p2, line 21: state where the 40% of NH3 emissions from mobile applies? U.S. urban areas? A national average?

p4, first paragraph: can you emphasize more what's new from your study? It simply says that it "add to a growing body of Nr modeling source apportionment studies"? For example; is your study more detailed than that of Zhang et al (2012) and Lee et al (2016)? Does yours use a different technique (e.g., tagged model vs. zero-out scenario and adjoint model)? Is your study at higher resolution or does your model contain more detailed processes than GEOS-Chem? Etc. Emphasize why it was important to do this particular work despite the previous publications. Please also add to Section 6 to emphasize the importance of what's new in this study.

p4, line5: The sensitivity tests you did are an important part of this paper. I suggest emphasizing this more here in the introduction that this was done, given the large model biases.

p7, line 8: Comparing Table 1 in this paper to Figures 8, 11, and 12 in Simon et al, (2012), and it seems like CAMx model performance is within the range reported in Simon et al. However, just because it is within the range of what other models do, it doesn't necessarily follow that the model results are "adequate". Also the Simon et al. (2012) paper summarizes results published between 2006-2012, whereas model publications 2013-2017 may have improvements. Can you please add a few more recent references which have similar model biases as yours, and add some further justification to what is meant by "adequate"?

p10, line 12: it is mentioned above this that NH3 from agriculture is emitted into the first model layer and therefore doesn't get transported as far. Can you please also

discuss the fire emissions – specifically how high they get put into the model? It is described a bit on p4, lines 19-20, but can you mention here approximately how high the fires spread in the vertical, and thus how it would affect deposition at some distance downwind?

Technical corrections

p2, line 18: particulate nitrate (NO3), and other...

p6, line 22: may be related with the high. . .

p10, line 19: There is no "Table S4" in the supplement document. The table on the last page of the supplement has no label, and doesn't seem to be what you're talking about here. I think you may mean Table S3.

p24, line 4: (caption to Fig 1) National Trend Network: typo in National

p5, line 4: I expected to see the 24 tagged regions in Fig 1 given the text here, but actually that map is Fig S2. Text should be clarified. And I feel that knowing where those tagged regions are is important enough to be included in the main paper, rather than the supplemental material.

p.14, line 9-10: It wasn't *measured* HNO3 concentrations were overestimated by 108%. Modelled HNO3 was overestimated.

Fig 9: the Oil and Gas pattern is difficult to see in the legend – looks very similar to the Other pattern in the legend, and doesn't seem to be as dark as in the pies. In the pies, the Oil and Gas is (I think) the gray, but the legend looks much lighter. This doesn't seem to be a problem in Figs. 6 and 10 which has the same system.

Fig 11: I think the legend at the bottom should be removed because seeing MOZART/IMRPOVE next to the red square with the line through it is confusing and doesn't really make sense. It's not needed since in the text we know that the BC came from MOZART, and from the caption we know that the simulation was sampled at IM-

PROVE sites.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-372, 2018.

Interactive comment

Printer-friendly version

Discussion paper