

***Interactive comment on* “Long-term trends in total inorganic nitrogen and sulfur deposition in the U.S. from 1990 to 2010” by Yuqiang Zhang et al.**

Anonymous Referee #1

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The manuscript discussed twenty year trends in nitrogen (N) and sulfur (S) deposition in the U.S. based on the WRF-CMAQ model simulations. The article identified the current limitations of modeling nitrogen and sulfur deposition and discussed spatial distributions and trends of those species in the U.S. Those results confirmed that reduced nitrogen had dominated the total nitrogen deposition in the U.S. and highlighted the necessity of controlling reduced N. The structure of the manuscript, the results and the presentation of the material are reasonably good. The topic is relevant and certainly deserves publication in Atmospheric Chemistry and Physics. There are, however, several changes and additions required before publication. Specific comments: Page 2, Line 5-6: Please split up these references so that they are associated with the specific impacts being discussed, rather than all placed at the end of the sentence. And, I do

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not think increased sulfur deposition could cause aquatic eutrophication. Page 2, Line 20: Change “pattern” to “patterns”. Page 2, Line 26: Please explain “complexity” more. Page 3, Line 20: Change “description” to “descriptions”. Page 3, Line 22: Add “supporting” in the front of “Table S1”. Page 3, Line 22: O₃ and PM_{2.5} should be defined at first mention. Page 3, Line 24-25: Provide some references. Page 3, in section 2.1: The authors should specify how the dry depositions were estimated. Page 4, Line 11: I am not sure whether the 110th meridian west is appropriate to divide east and west. There are more sites in the east than the west if 110oW is used. A map with 110oW and all the sites should be included in the supplement. Page4, Line 13: How did the authors get the value of 0.984? Page 5, In 3.1, Could the authors be more specific about the improvements since Appel et al (2011)? Page 5, It seems like the authors only did model evaluation and model justification for wet deposition. How was model performance for dry deposition? The authors could use data from AMON, IMPOROVE and EPA CASTNET to do this work. Page 5, Line 19: Change “models” to “model results” Page 6, Line 15: It should be “Table S3” Page 6, Line 26 – Page 7, Line 2: Please explain the reasons for those results. Page 7, Line 11- 20: Which one dominates the decrease of TSO_x, SO₄₂₋ or SO₂ ? Page 26, The legend of Fig 8 (a) needs to be fixed.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-116>, 2018.

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