

Interactive comment on “A multi-resolution assessment of the Community Multiscale Air Quality (CMAQ) Model v4.7 wet deposition estimates for 2002–2006” by K. W. Appel et al.

Anonymous Referee #3

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The paper is generally good, thorough, addresses an important issue, and is appropriate for this journal. Parts of it are wordy and could benefit from some tight text editing.

P. 2323: Portions of section 3 are tedious to read due to all the numbers thrown about. A succinct summary of results in a few tables plus verbal highlights of the most interesting results should suffice. If more detail is desired then it could be placed into the supplementary material.

P. 2323, lines 3-5: The argument that errors in wet deposition scale linearly with errors in precipitation is appealing despite the non-linear relationship between wet deposition and precipitation amount. However, I would like to see more support for this statement.

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What is it about the two processes that might cause errors to be coupled in a linear fashion? Please note that you shouldn't use the circular argument that the assumption is proven because your error-based linear adjustment to wet deposition worked well.

P. 2329, lines 17-20: The reader will certainly like to know roughly how the bidirectional ammonia model works, or at least how it is implemented in CMAQ. Perhaps an appendix or description in supplementary material would be an appropriate venue for describing the model. Without this we do not know why it should have the success it seems to have.

P. 2330, section 3.4: Ammonia and nitric acid are intimately linked. When they combine into an aerosol they change the deposition characteristics, especially dry fluxes, of nitrate because aerosols deposit at rates different from nitric acid. In turn, this can change the average lifetime of total nitrate (particulate plus nitric acid) in the atmosphere and has the potential to modify nitrate wet deposition patterns. The paper does not mention whether the bidirectional modeling of ammonia affected nitrate wet deposition. If not, then the authors should mention such. Otherwise, some comments on the nitrate wet deposition response to bidirectional ammonia modeling are appropriate here.

Interactive comment on Geosci. Model Dev. Discuss., 3, 2315, 2010.

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