

Interactive comment on “Multi-model mean nitrogen and sulfur deposition from the Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP): evaluation historical and projected changes” by J.-F. Lamarque et al.

Anonymous Referee #3

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This is a very well written paper, which provides an excellent summary of the ACCMIP simulation. It is accompanied by a robust analyses of the model results with available measurements on wet deposition. A lot of detail is provided in forms of Tables and Figures, which are of good quality and support the key points of the manuscript. Overall, this is a novel and important contribution to the field and I have mostly minor comments.

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Given the sparseness of observations over large parts of the world, substantial uncertainties remain. What I've been missing is a discussion of how to improve the situation by a) suggesting types and regions for measurements which are currently under sampled and potentially also uncertain given the larger model spread identified e.g. in Figure S6, as well as b) a discussion as to why the models differ, and which parts of them need to be improved.

Minor comments

Introduction. Since the title mentions N and S, I would have expected a little introduction early on as to why S deposition is important similar to the first paragraph on N deposition. There is a sentence in page 6251, line 13ff, which seems too late.

page 6251, line 22: “rather representative”. Are they representative or not, and if not, in which aspect?

page 6254, line 3ff: It would be very helpful here to have a table, which model provided which output - otherwise this section is too vague to really follow.

page 6255 line 2: please provide a reference or something comparable for the wet deposition data set used.

page 6255 line 6: please specify the criteria of what is “good”.

Section 5: I would propose to split this into two subsection, one focussing on the recent past (1980-2000) and one on the change from the “pre-industrial state”. (1850-2000).

page 6259, line 3: It's not immediately clear what “This” refers to, please clarify.

Section 6: It would make sense to mention the time-scale in the heading, as has been done for Section 5.

Page 6262 line 5. It would be good if the authors could add a little discussion of the reasons for the larger model spread in Central Asia and South America - if possible

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