

Interactive comment on “Multi-model study of HTAP II on sulphur and nitrogen deposition” by Jiani Tan et al.

Anonymous Referee #2

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This study gives a comprehensive overview of the global atmospheric deposition of sulfur and nitrogen using a range of global atmospheric transport model, compared to observations for 2010. The manuscript is well written. I have a few questions and remarks:

Line 157. What does it mean that models are excluded if they fall outside their emission values? Several of the models given in table S1 and S2 don't calculate wet/total deposition? Are these models not used or have you deleted part of the calculations (i.e only used aerosol and not wet deposition) ? Maybe indicate which models used for each ensemble mean. If that is S1 and S2, maybe indicate what has been deleted? Are you looking at the surface emissions or total emissions, several models do not include emissions of DMS? A follow up question on this topic, why don't the total emissions

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and deposition match up (i.e. 7 Tg S and 1 Tg N differences in table 3 and 4)? Where does the left offers go, Have the models included organic N and S species?

Line 201. Data from 43 stations of the 52 available EANET stations are used. It seems like you have included all station times, urban as well as remote, which surely have different representativity for the region. Later you state that you delete sites with high Ca values (line 219), which can be an indication of urban dust, but these may also be from also from regional dust. Not sure if I understand the reasoning behind this way of selecting the sites.

Line 215. The outliers in Norway and Poland are probably due these specific location with high precipitation amount (Norway) and high altitude (Polish site PL03 is at 1600moh.). Have you checked how well the models compare with precipitation amount contra concentration levels in precipitation?

Line 235 “According to Fig. 2(d), the over-predicted stations are mainly located in Midwestern and Southeast United”. For me it seems like a general tendency (fig 1d). Maybe include information that 67 % of the station are within 50%.

Line 265. “The NH₄ wet deposition is somewhat underestimated in all 3 regions”. This is not the case for US (NADP) if one look at table 1 where the HTAPII is higher than observations

Line 350. “The ocean serves as an important sink of S deposition”. But it is also a very important source. The net effect is only 3 TgS

Table 3,4,5. It is a bit confusing for the reader when you have defined two different categories continental coastal and ocean coastal which are the same thing. Would be more readable and less confusion if these cells are merges so it is clear that there are three categories (Ocean, Continent and Coast)

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