Review of Ge et al. ACP-2022-82

General comments:

The manuscript provides a comprehensive analysis of the concentrations, wet and dry deposition, fluxes, and lifetimes of reactive N and S gases and aerosols globally, and for 10 world regions. The goal of the manuscript is to conduct a more up-to-date examination of atmospheric processes affecting the fate of reactive N and S, particularly of the reduced N species NH_3 and NH_4^+, for developing mitigation strategies according to different regional conditions. Overall, this study is an important contribution to the field as it highlights the substantial regional variation in N_r and S_r budgets and the need for modelling to simulate the chemical and meteorological linkages underpinning atmospheric responses to precursor emissions. The manuscript is well written and structured clearly and fits well the scope of this journal. I recommend that this study can be accepted for publication after the specific comments below are addressed.

Major comments:

1. Section 3.1.2, lines 225-228: What was the rationale for choosing the fine SIA concentration of 0.5 μg m^{-3} as the threshold?
2. Section 3.3.1, lines 460-464: To increase study reproducibility and transparency, the authors may want to consider providing detailed calculation equations of atmospheric burdens and lifetimes (perhaps adding a section in the supplementary).
3. Section 3.3.1, lines 517-520: In general, gaseous NH_3 deposits quicker than aerosol-phase NH_4^+. Could you provide more information on the difference between NH_3 deposition and NH_4^+ deposition in the model as deposition is crucial for lifetime calculations?
4. Section 3.3.3, lines 618-619: Is there any explanation for why does South America have such large proportion of RDN in the form of NH_3?

Technical corrections:

Line 758: DOI information is missing in this citation. Please add the “doi” number before “2013b”.

Line 809: Please add the “doi” number before “2005”.

Line 896: Please add the “doi” number before “2015”.

Line 966: Please add the “doi” number before “2012”.