

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2021-342

Anonymous Referee #1

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Referee comment on "Modelling changes in secondary inorganic aerosol formation and nitrogen deposition in Europe from 2005 to 2030" by Jan Eiof Jonson et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-342-RC2>, 2021

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This is a policy relevant science paper since it investigates the sensitivity of secondary inorganic aerosol formation and thereby of inorganic reactive nitrogen deposition to emission changes over Europe using the EMEP model. The manuscript is written in a clear way and the conclusions are sound. It requires only a few minor corrections before being suitable for publication in ACP. Several papers have investigated the interplay between SO<sub>x</sub>/NO<sub>x</sub> and NH<sub>3</sub> emission changes. Nenes et al. (Atmos. Chem. Phys., 20, 3249–3258, 2020 and Atmos. Chem. Phys., 21, 6023–6033, 2021) provide a very interesting modeling framework to evaluate when particulate matter and dry deposition of inorganic reactive nitrogen are sensitive to ammonia and nitrate availability using aerosol pH and liquid water content as drivers. I think the present manuscript would benefit from a relevant discussion and comparison to these findings.

Minor corrections are listed below:

Line 51: sulphate

Line 73: differs

Line 100-102: could you provide an equation for this ?

Line 134: as ammonium is either...

Line 145: is deposited than is emitted

Line 212: is small

Figure 1a: emission units should be  $\text{Gg.y}^{-1}$

Figure 3 caption units should be  $\text{mg(N).m}^{-2}.\text{y}^{-1}$

Table 2 – please clarify what meteorological data are used for each simulation year.

In figure 5 the CL exceedances are given in  $\text{eq ha}^{-1} \text{y}^{-1}$  while in Figure 3 for the deposition fluxes the surface unit is  $\text{m}^2$  – could you make them uniform ?