

Interactive comment on “Role of ammonia in European air quality with changing land and ship emissions between 1990 and 2030” by Sebnem Aksoyoglu et al.

Sebnem Aksoyoglu et al.

sebnem.aksoyoglu@psi.ch

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We noticed that one of our replies was not fully implemented in the uploaded file. Please find below the complete answer with the missing part :

reviewer comment:2. This study seems to ignore the impacts of co-deposition, in which the acidity of the surface (affected by both SO₂ and NH₃ emissions, and their trends) changes. The impacts of this process on trends have been explored in for example Wichink Kruit et al. (2017).

our reply: The CAMx dry deposition model considers these effects. We added the

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following text in the revised manuscript:

P5, L129 The surface resistance is an area of great uncertainty in deposition models. Surface wetness plays an important role for both cuticular and ground resistance. This effect is included in some deposition velocity algorithms. The parameterizations for wet cuticles and ground are quite variable between models. Some models such as CMAQ use the Henry's Law constant to account for the solubility of chemical species, the EMEP model (Simpson et al., 2012) considers the chemical content of dew by treating co-deposition of species such as SO₂ and NH₃ while Zhang et al. (2003) includes the consideration of friction velocity. Wichink Kruit et al. (2017) showed the effects of co-deposition, chemistry and meteorology during 1993-2014 in the Netherlands. Relatively wet conditions led to lower ammonia concentrations, while warm and dry conditions led to higher levels.

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