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Biogeosciences Discussions

Interactive comment on "Governing processes for reactive nitrogen compounds in the atmosphere in relation to ecosystem, climatic and human health impacts" *by* O. Hertel et al.

Anonymous Referee #2

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The paper from Hertel et al. "Governing processes for reactive nitrogen compounds in the atmosphere in relation to ecosystem, climatic and human health impacts" summarizes the current knowledge on reactive nitrogen sources and sinks in relation to involved turnover processes. They focus mainly on results obtained in European research projects. A focus is given to the emissions of N species such as ammonia and nitrogen oxide (Ch2), transformations of NHx, NOy as well as Norg in the atmosphere (Ch3) and dry and wet deposition of various N species (Ch4 and 5). While the overall content of the paper is satisfactory, I have the feeling that the structure of the paper could be somewhat improved. Title: The authors should think about changing the title. To my feeling, none of the chapters is really investigating the "relation [of

Nr] on ecosystem, climatic or human health IMPACTS". Apart from the abstract and introduction, human health impacts are not further discussed in the review at all. Climate impacts are somehow discussed, but this topic is also not really in the focus of the study. None of the chapters is explicitly dealing with the impact of Nr on climate change. The authors further do not investigate the impact of Nr with regard to impacts on ecosystems. P6 L18 In the introduction to section 2 the authors state that the major components of emitted Nr include NH3, NOx and organic N. While NH3 and NOx are dealt with in separate sections (ammonia emission in 2.1 and nitrogen oxide emissions in 2.2) there is no section devoted to organic N. Why? P8 L16 The authors first describe a generally accepted and obviously widely used separation (parameterization) of ammonia emissions in a bullet point list on P7 L8 to P8 L3. They then, however, use a different parameterization to structure sections 2.1.1 to 2.1.4. In section 2.1.4 they handle all the non-agricultural sources and the last bullet point of the agricultural sources' list. Why? P8 L 19 I suggest first to describe the general knowledge about storage and house emissions and then follow with a description of how these are modeled. Beside this, it is not clear to me why modeling approaches are described in this section at all, as in the further sections 2.1.2, 2.1.3 and 2.1.4 no models are mentioned (despite that there are many models available to simulate these other emissions). P13 L3 To my feeling the structure of chapter 2 is somewhat unclear. For ammonia ,section 2.1 is structured in sources, spatial distribution and trends. For nitrogen oxides 2.2, the structure is completely different and sources are described in a separate section 2.3. Further, for nitrogen oxides one section discusses temporal trends and another one projections, which is not the case for ammonia. P15 L12 What is the reason why agriculture plays such a dominant role for NO emissions on the global scale but seems almost negligible in Europe? P24 L15 according to the structure of the paper, the discussion of PAN deposition should be moved to the following section that deals with deposition in general. P36 L7 What about fog deposition? This can be very important for some ecosystems and I guess that the uncertainty of quantification of fog inputs in general in combination with uncertainty in wet deposition chemistry introduces a rel-

ative large uncertainty of this sink term. References for the problems in quantifying precipitation inputs in general seem to be missing (reading further, I realized that this topic is separately dealt with in 5.4. I suggest to merge 5.1 and 5.4,as the cloud droplet deposition is part of the wet scavenging of aerosols). P38 L1 I find the discussion on the contribution of wet/dry deposition relatively short. Are there no further information available? I guess from a budgeting point of view, this relation is quite important. P40 L3 the conclusion section mainly summarizes some of the statements given in the respective sections of the paper. For a review paper I think the authors would do a good job in identifying those fields in Nr research, where the biggest knowledge gaps or uncertainties exist (e.g. DON).

Please see attachment for specific and technical comments.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/9/C4417/2012/bgd-9-C4417-2012-supplement.pdf

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