**Biogeosciences
Discussions**

Interactive comment on "Uncertainties in model predictions of nitrogen fluxes from agro-ecosystems in Europe" *by* J. Kros et al.

Anonymous Referee #2

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BGD 9, 6051-6094 Title: Uncertainties in model predictions of nitrogen fluxes from agro-ecosystems in Europe Authors: Kros et al.

This paper describes an interesting analysis of uncertainties in modelled N fluxes in agricultural systems in EU27 countries. The approach is interesting, since a variety of models are being used to model the nitrogen cycle in agriculture, but uncertainty estimates generally are limted to minor N flows such as nitrous oxide, or are simply lacking.

However, the paper suffers from numerous repititions, making it often confusing, and many paragraphs are unclear. A first estimate is that the text can be reduced by 30% by removing repititions and shortening all lengthy sentences.

Also, the paper in many places lacks structure (e.g. discussion in the results section, conclusions in the discussion section), and this makes reading and understanding a difficult task.

Finally, many choices made by the authors have not been supported by good arguments.

My first advice to the authors is to take more time in future before submitting. My major comments are:

-Page 6054: The example of de Vries et al. (2003) is given, stating that this study did not cover the uncertainty due to spatial model inputs. Readers would expect then that in this paper the uncertainty in spatially explicit data is analyzed. If this is so important, why not include this aspect. Why is it beyong the scope of this work (page 6059)? Computing time can not be an argument any longer.

-Page 6055, last para, first sentence: completely unlcear what the authors intend to say.

-Page 6055, last line: it is not clear how animal manure is distributed in the model, and how it differs between countries.

-Page 6056, first line: reference is needed here.

-Page 6056, 2nd para: a lot of attention is paid to the modeling of leaching from stored manure, but is remains unclear how leaching and surface runoff are computed.

-Page 6055-6056: it is unclear how N withdrawal by crops is computed.

-Page 6055-6056: perhaps summarize all the N budget terms in a table with some accompanying text would be easier for readers. Please order the budget terms in a meaningful order to help readers.

-Page 6057: faostat needs a reference.

-Page 6057, 2nd paragraph: data on animal populations are from Klaassen et al, but where did they obtain the data? What is the are weighting, both for animals and fertilizer (previous page).

-Page 6058: uncertainties resulting from model strucutre only make sense when the input data are the same.

-Page 6059, last line: what is a plot? Is it the same as an NCU?

-Page 6060 line 10-13: Why were lognormal distributions assumed, and why were spatial and cross-correlations log-transformed? The chance to draw the default value is largest. So a uniform distribution is probably a wiser choice. In addition, the arguments are lacking for selecting lognormal distributions and why using logtransformations.

-Page 6060, line 15: it is stated that CV is used rather than SD, but this is not correct. Both are used, and it is not discussed why in some cases CV and in other cases SD.

-Page 6060, line 23: crop uptake is not from statistics, but it is in the group of input data taken from statistics with a low CV. In addition, these statistics are on a country scale and then downscaled to smaller regions. This procedure may imply considerable uncertainty. A discussion on the grouping of input data in CV classes is missing.

-Page 6062-6062: complete abacadabra.

-Page 6064, 3d paragraph: it is stated that 1000 model runs is adequate, so please provide arguments for this statement. Our expereince is that with so many variables this may not be adequate.

-Section 3.3: seven groups? Table 5 and figure 6 show only six! 56 parameters? Page 606 line 12 says 51!

-In section 4.1.2 the authos discuss that the variation in uncertainty in nitrogen leaching and runoff is related to soil properties. Is the variability in uncertainty or uncertainty meant here (spatially explicit variables were not included). This contrasts with section

4.2, where the uncertainty is nitrogen leaching and runoff is mainly caused by nitrogen inputs, leaching parameters and crop uptake???

-Page 6068, last para: this is complete abacadabra!!!!

-Section 5, first part and section 5.1: several times the authos state that neglecting spatial correlation leads to overestimation of uncertainties. This discussion could be reduced considerably, and, in addition, it is not interesting to know that N2O emission is some part of the |Netherlands is 20.5 kg per hectare per year.

-section 5: comparison with uncertainty estimates of ammonia emissions by Beusen et al. 2008) Atmospheric Environment is lacking.

-Section 5.1: is relative uncertainty of 7% for USA substantially smaller than 12% for EU27? My guess is that it is very much the same, in view of the difference between US and European agriculture. In fact, are these numbers comparable?

-Page 6071, 2nd para, last sentence: very good remark that validation with measurements is a good approach. I guess that this remakr fits better in the introduction.

-Section 5: is the robustness analysis not discussed?

-Section 4.3: I suggest to have a true conclusions section, and not hidden in the discussion. In addition, stating that something is rather low needs some comparison: is lower than something else.

Some detailed comments: - Avoid "used approach". This is Dutch.

- Avoid "more or less" and other confusing expressions. Something is true or not, but not more or less true.

- Page6068, 1st line: what is the uncertainty due to robustness scenarios?

- Page 6068, line 10: only nitrogen fluxes were analyzed.

- Avoid "As discussed before".

- Variable names may be the same as in the model code, but for readers names like ctNplmx_gi are difficult to understand and remember.

- Figure 6: Nle_sw is correct?

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