

#bg-2014-622

Title: Modelling the effect of soil moisture and organic matter degradation on biogenic NO emissions from soils in Sahel rangeland (Mali)

General comments

Delon et al. provide a comprehensive and rather well-written overview of practical stepwise application of three different models (STEP, GENDEC and NOFlux) to simulate potential biogenic NO emissions under scarce available data condition for understudied arid region (Sahel, Mali). Indeed, such coupled model is desirable to roughly rapidly estimate NO emissions in remote or abandoned regions with a little input data. However I am concerned about the validation of this model, since the measured data are really very limited and, besides these data do not coincide well with simulated ones. Nevertheless it is still noteworthy attempt which can give a hint to scientific community to stimulate further field measurements and to look closer to couple model approaches for remote regions investigations. Therefore, I can recommend publication of the manuscript in BG. However, there are some major points that should be addressed in order to increase the accessibility of the text and to discriminate it from reviews that have been published recently.

Major points

1. Authors have too little measured data for model validation
2. Authors should try to think how present more attractively the 'coincidence' of these scarce data of wet season with your simulated ones. As it is now I would not present them in Fig. 6, because they 'tell' nothing for support your model. Otherwise you can exclude it from Fig.6 and mention only average values in Table 3.
3. It is still not clear for me why you prefer to use units per year (kg N ha⁻¹ yr⁻¹) throughout the manuscript for mean values. It is not possible to express daily and seasonal average (or even sum) in per year units. Is it just common mistake? Please explain it.

Minor points

Introduction section. Please use updated knowledge from some recent reviews (see below) for that section (e.g. in P1157: L8-9, L25-26)

Schreiber et al., 2012. Nitric oxide and nitrous oxide turnover in natural and engineered microbial communities: biological pathways, chemical reactions, and novel technologies.
doi:[10.3389/fmicb.2012.00372](https://doi.org/10.3389/fmicb.2012.00372)

Pilegaard, 2013. Processes regulating nitric oxide emissions from soils. doi:[10.1098/rstb.2013.0126](https://doi.org/10.1098/rstb.2013.0126)

Medinets et al., 2015. A review of soil NO transformation: Associated processes and possible physiological significance on organisms [doi:10.1016/j.soilbio.2014.09.025](https://doi.org/10.1016/j.soilbio.2014.09.025)

P1158: L2-3 Very general statement. Please concrete which gases do you mean (quotation is needed)

P1158: L15 What about re-deposition in form of NO₂ (check Gessler et al., 2000; Butterbach-Bahl et al., 2004)

P1159 L13-16 I think it is too ambitious statement that modelling can help to describe and understand processes ... I think it is other way around: laboratory and field measurements can describe and help to understand process and can help improve model as well.

P1163 L16 Ozone

P1163 L18-20 Please indicate at which height NO ambient concentration was measured (in chamber or 2 m height or)

P1163 L22 Please indicate below which magnitude

P1163 L27 The same as previous

P1165 L12, L14 and FURTHER THROUGHOUT THE MANUSCRIPT It is not correct to express daily fluxes in kg N ha⁻¹ yr⁻¹ (should be per s⁻¹, min⁻¹, h⁻¹, d⁻¹).

P1171 L7-8 Estimated or measured data? Your data or include citation

P1178 L7-8 If your data put R value or quotation

P1178 L28 Please cite these several studies

P1179 L1 It is totally different example. Can you cite example from semi-arid or arid regions

P1179 L6-7 Where did you get data for ratios. I missed any dry season data throughout the manuscript (only wet season and annual data were mentioned). Please include it in Table 3 or mention somewhere.

P1181 L25 reSpiration

P1183 L21-22 Even wet season dataset is not enough for validation, but not only dry season data

Table 3. Check UNITS for mean values! Include dry season data if any?! I would suggest to arrange all the mentioned data chronologically for each site (easy to deal for readers)

Figure 2. Name of Y axis: 'Soil moisture' is better than 'Soil humidity'

Figure 6. Already mentioned in Major points