

Interactive comment on “Use of laboratory and remote sensing techniques to estimate vegetation patch scale emissions of nitric oxide from an arid Kalahari savanna” by G. T. Feig et al.

Anonymous Referee #1

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1/ General comments The topic of the paper is to develop new ways of estimating NO biogenic fluxes from soils thanks to empirical parameterizations and remote sensing and GIS methodologies. This is particularly interesting in arid and semi arid regions where quasi no flux measurements are available. Therefore, this paper could have been of great interest for the reader, but this enthusiasm is rather decreased when we read the Feig et al. (2008), which treats exactly about the same subject, but in another region and at a smaller scale. The first comment I would make is that the reader should have been aware that this paper "Use of laboratory and remote sensing techniques to estimate vegetation patch scale emissions of nitric oxide from an arid Kalahari savanna" is in the continuity of the first paper published in BG "Soil biogenic

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emissions of nitric oxide from a semi-arid savanna in South Africa". Feig et al. (2008) is often mentioned, but the author does not say that the new paper uses the same flux measurements techniques and the same approach to determine fluxes at the regional scale. No doubt that this second paper has its own interest, but lots of paragraphs are written exactly in the same way (including the introduction!) in both papers, and in my opinion the paper I have reviewed has to be condensed, shortened and rewritten entirely, not to be a copy in numerous parts of the first paper mentioned above. Differences and similarities between the two papers have to be mentioned at the beginning. (Measurements techniques for flux are similar, but up scaling does not use the same methodology and gives a larger "window" in arid regions)

Furthermore, this manuscript is very too long (too much paragraphs also) and too descriptive and has to be rewritten because of lots of typos, and lots of non english or non understandable sentences. A large effort of synthesis has to be made, particularly between Results and Discussion parts, which should be written as one part only to avoid repetitions.

However, the paper addresses relevant scientific questions within the scope of BG, and should deserve publication after MAJOR corrections.

2/ Specific and technical comments

Abstract.

- p 4622, lines 16 to 19 (Up-scaling...Pan patches): Rewrite the sentence, it is not possible to understand if the highest flux of 323 g.ha⁻¹.month⁻¹ is in perennial grassland patches or not. - in the conclusion you speak a lot about pyrogenic emissions, you should therefore mention that in the abstract.

Introduction.

- This introduction is really similar to the one in Feig et al., (2008), even if new references are included. It has to be shortened and should emphasize the new features

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developed in this new paper, in comparison to the other one.

- You should give some references about the importance of pH influence and sand percentage on NO biogenic emission.

- p 4624, lines 7 to 10 (In a previous...2004). Does this sentence bring an important element for the comprehension?

- p 4624, line 26, should be ; instead of , after "north".

- p 4624, line 27, should be ; instead of ; after "south".

- p 4625, lines 16 : "previous" should be "following"

- p 4625, lines 16 to 22: a lot of references are cited, but the reader has got no idea of what is developed in these studies. One word or 2 should be given on the different methodologies used, without explaining them in details of course.

2- Methods and sampling

-Here, the author should refer to Feig et al. (2008) from 2.2 to 2.7, and should not develop again the equations and techniques. Only a short statement of the methods should be given to the reader in one paragraph.

- In 2.3 "laboratory incubation and net NO release from soils", it is mentioned that pulse effect accounts for less than 6% to the annual flux, but more recent studies like the one of Yan et al. (2005) find that in some parts of the world the pulse effect can contribute up to 20% of the annual flux!

-Part 2.7 (error estimation) has to be shortened.

- 2.8 should be removed.

- 2.9 Title is not appropriate. Should be "Remote sensing and GIS techniques used for the up scaling".

Too many details are given in 2.9.1 "Land use classification". It makes the paragraph

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hard to understand and should be condensed. The end of the paragraph could be removed (p 4637, lines 19 to 24) or written later in the text.

- p 4636 lines 3 to 4, sentence "up scaling... fig1" should be rewritten.
- p 4636 lines 6 to 8, coordinates of the box could be given on the figure.
- p 4639 line 19 add an s to depth.

3- Results

This part is a kind of long description of figures and tables and does not provide any scientific conclusion. Results and Discussion parts should be condensed together, in order to avoid repetitions in the discussion part.

-p 4639, lines 14 to 4 in p 4640 is only a description of table 2, this paragraph should be removed.

- 3.2 "vegetation cover": this paragraph seems to refer to figure 2 but figure 2 is not mentioned! This paragraph should be removed too because it is a description of figure 2.

The author should give the interesting characteristics without describing figures and tables in detail.

-3.3 "laboratory NO flux" p4641 lines 2 to 3: sentence "The flux... uptake" is not understandable.

- p4641 lines 5 to 8 (The highest... Patch) is hardly understandable;
- p4641 lines 12 to 20: this paragraph contains too long sentences. It should be rewritten.
- p 4642, lines 13 to 15: this sentence is not correct.
- p 4643 lines 26 to p 4644 line 4: this is only a description of figure 5, and no scientific interpretation is given. Should be written within the discussion part.

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- 3.6 "NO up scaling"; P 4644 lines 6 to 9: this sounds like a repetition of what has already been said before, and will be said again in the discussion part: not necessary.

Furthermore, 4 paragraphs have the same name: 2.9.4 "NO upscaling", 3.6 "NO up scaling", 3.6.4 "up scaled NO fluxes", 4.6 "up scaled NO fluxes"...

Even if the contain of these paragraphs are not exactly talking about the same part of the study, a hard work of synthesis has to be made here, firstly in the plan, to avoid lots of repetition.

- p4645 line 4: driest should be drier.

- p4645 line 7 to 8, (Thomas et al; 2008) should be Thomas et al. (2008).

- p4645 line 10 Fig 10b should be Fig 9b

- p 4646 paragraph 3.6.4 is too long and not easy to read. Should be rewritten.

- p 4646 lines 25 to 26 sentence "During...were" is not correct.

- p 4647 lines 8 to 20: these 2 paragraphs should be in the result part, which corroborates the suggestion to condensate (and shorten) result and discussion parts.

- p 4648 line 16 to p4649 line 18, 4.2 "net potential NO flux": this has been already developed in Feig et al. (2008) in the same way. Is it necessary to repeat that again?

- p4649 lines 20 to 23: the sentence is not understandable.

- p 4650 lines 1 to 19: this has already been said, the author should not repeat again the same results.

- p 4654 line 14 typo at the middle of the sentence.

- p 4655 lines 4 to 11: this sentence should be rewritten.

- p 4655 lines 16 to 18: sentences "The other... 1.04 Tg.yr⁻¹" is not correct.

- p 4655 lines 21 to 22: there are repetitions in these sentences that should be re-

moved.

- p 4656 lines 21 to 23: The author should add , in the sentence to be more understandable.

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