

Interactive comment on “Denitrification, carbon and nitrogen emissions over the Amazonian wetlands” by Jérémy Guilhen et al.

Anonymous Referee #1

Received and published: 26 February 2020

The manuscript (ms) under review presents a new approach to estimate the emissions of CO₂ and N₂O from the various floodplains along the Amazon River during 2011 and 2015. The approach combines satellite data (-> estimate of the water surface) and in-situ data with an empirical assessment of the nitrate reduction rate (i.e. denitrification) in the upper soil which in turn results in production and emissions of both carbon dioxide (CO₂) and nitrous oxide (N₂O). Although the presented results are of interest for a wider community, I have some concerns about the approach used for NO₃⁻ reduction. Therefore, I can recommend publication only after major revisions.

Specific comments: - The NO₃⁻ loss in the floodplains is solely attributed to denitrification. However, NO₃⁻ loss in soils can also take place during dissimilatory nitrate reduction to ammonium (DNRA) (see e.g. Rutting et al., Biogeosci, 8, 2011). So, I am

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wondering whether this could affect the estimate of CO₂ and N₂O emissions. Please discuss. You may need to adjust the equations (1) to (4) to account for DNRA. Please replace denitrification with 'nitrate (or NO₃⁻) reduction' throughout the text.

- The amount of N₂O produced is calculated with a constant N₂O/N₂ ratio of 0.1. You can do so but, unfortunately, there is no reference given for it (P6L22). Moreover, it should be discussed whether this ratio is constant or variable in the Amazonian wetlands. In other words, how representative is the selected value of 0.1? This is an important point because the choice of this ratio directly determines the magnitude of the N₂O emissions and the variability of this ratio determines the 'error bar' of the N₂O emission estimates.

- I am wondering why nitrification as a source of N₂O under low O₂ is ignored. Please discuss.

- Title: Please note that the term 'carbon emissions' also includes emissions of methane and other C-containing gases which are not subject of the ms. Moreover, NO₃⁻ could be lost during dissimilatory nitrate reduction to ammonium (DNRA), see my comment above. To this end, I suggest to modify the title to 'Nitrate reduction and associated carbon dioxide and nitrous oxide emissions from the Amazonian wetlands'.

- The central and lower panels of Figure 6 are meaningless. They show exactly the same graphs but scaled with a factor of 5 (for CO₂, see equation (4)) and 0.1 (for N₂O; N₂O/N₂=0.1). Please remove.

- Please avoid using colloquial terms such as 'paramount' (see P2L11; P4L2; P18L9) or 'hot moments' (see Section 3.1). They should not be used in the context of a scientific text.

- Please have the text proof read by a native English speaker. There are many sentences and phrases which are odd.

- There are several (annoying) typos: mole should read mol (various places throughout

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the text); 'og' should read 'of' in the caption of Fig. 5; N20 should read N2O (Fig. 5); 3rd column/2nd line in Tab. 1: there is something wrong with the exponent; 'anomalies' should read 'anomalies'(P13L15), etc.

- Please replace NO3 with NO3- (in the equations as well as throughout the text and figures)

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-3>, 2020.

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