

Biogeosciences Discuss., referee comment RC1
<https://doi.org/10.5194/bg-2021-28-RC1>, 2021
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Comment on bg-2021-28

Anonymous Referee #2

Referee comment on "Soil greenhouse gas fluxes from tropical coastal wetlands and alternative agricultural land uses" by Naima Iram et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-28-RC1>, 2021

Thank you for the invitation to review this manuscript. I have found the paper interesting and enjoyed learning about the study system. The paper is ambitious and presents management recommendation that would be of relevance to policy makers and land users. I have made comments and suggestion which are listed below aiming to support the authors in their ambition to offer evidence based management solutions to coast wetlands.

L17 comma needed after typical

L26 The last part of the sentence about financial incentives does not follow logically from the first part. Please rephrase.

L34-36 Clunk sentence, please rephrase.

L37 ... favour emission of potent greenhouse gases (GHG) e.g. CH₄ and N₂O

L44 Reference needed.

L45 while – remove

L48 convoluted sentence, please improve sentence structure

L51-53 References needed

L60-61 References needed

L66-77 Sentence does not flow well from the previous statement.

L66-67 Can you please make this nuanced to reflect that it is the balance between process rates and the area over which they occur determines the important for tropical regions net emissions.

L83-85 This sentence is not clear to me. Can you please improve the flow of the text. You need to explain the rationale for high emissions during high tides. In the intro you agree

that more sulphate reduce CH₄ production. These points seem contradictory to me.

L131 Four or three sampling events? This is a bit unclear to me. Is it correct that you measured during different tides only once? You need to consider if that is enough in the context of seasonally. The tidal impacts are a bit unclear to me, from the final sentence in the introduction it sounds to me that all of the wetlands are impacted by tides? Please clarify this.

I suggest you swap the order of section 2.2 and 2.3 as you refer to the gas chromatography set up in the current section 2.2

Section 2.3

You need to include some detail on the spatial distribution of your samples. What is the size of the sampled area and how did you determine if it is representative of other systems with similar land use? I have the feeling that there is a risk of pseudo replication but can't assess that without some more detail. If you have subsamples within the same area rather than independent replicate samples from each land use class that need to be reflected in your conclusions. If you do not have independent replicates you do not have the statistical basis for making statements relating to land use, you can only state that the sites are different so you need to be much more cautious in your recommendations in the discussion.

What method was used for the randomisation?

How did you deal with areas with vegetation?

What number of gas samples were collected from each chamber after the initial tests?

During which season did you test for linearity?

I think you may well have impacts of ebullition of CH₄, there are signs of that in Figure 2. If you could not test for linearity for CH₄ fluxes especially during the flooded period your fluxes may not be correct.

Some of your areas look as if they have standing water, how did you sample gas fluxes on these? Did you use floating chambers? Please add more detail about the sampling.

Your statistics are not clear to me. Please add some more detail to make it clear how you analysed for variation and interactions between the two main factors in your study site and season.

L185 What is the assumption of $w=17.38$ for each season based on? This needs to be justified in the context of seasonal climate data.

What are the number of temporal replicates within each season $n=1$?

Is table 3 the same data as in Figure 2. If so I suggest not to show the same data twice. If different please make captions and table headings clearer to help the reader understand the data.

L281-282-286 Here you are repeating results in the discussion. I suggest you focus this part of the text to compare and contrast to other studies.

L290 You state here that temperature is a driver of the fluxes you measured but your stats do not support this, i.e. no significant effect so I don't think this point is valid in

the light of your results.

L298 All your chambers were dark – I don't get the point of this statement. Why single out mangroves.

L300 High CH₄ emissions during the hot-dry season – How dry were the soil? Or were they sit wet in the high emitting sites?

I think the paper need to include some data in the environmental conditions measured in the different seasons to understand what conditions the microorganisms were experiencing.

Management implications section

Since I don't think you have independent replication (at least I can't determine if you do from the methods section) makes it hard to make strong conclusions about land use. As I mentioned earlier you can only state that you have differences between sites but not link these differences specifically to land use as other site specific effect may cause these differences.

In the discussion I think it is important to consider if your space for time model is valid, i.e. is it plausible that the current agricultural system would revert to function as the natural system you measured fluxes from? This needs careful discussion as ecosystem restoration does often not take you back to the starting point, or at least it can take a long time for the restored system to regain its original functions.

L304-309 You have not measured these parameters so you can only speculate that they cause low emissions. The way this statement is phrased suggests your study has demonstrated this which is not the case. Please rephrase.

Describe how you calculate your CO₂eq in the methods section and present this in the results before discussing these data.

Plant mediated emissions of CH₄ and N₂O are likely to be important in your system. As this would impact on your overall conclusion regarding the global warming potential of the different sites I think you need to discuss this.

After reading the manuscript I think that although it presents novel data, I do think it is premature to use the manuscript in its current form as a basis for management recommendations.