Review Form 3

Journal Name:	**International Journal of Environment and Climate Change**
Manuscript Number:	**Ms_IJECC_123184**
Title of the Manuscript:	**Effect of Temperature, Mid-Season Drainage, Sulphate Addition on the Methane Emission and Carbon Flux from Rice Fields**
Type of the Article	

General guidelines for the Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
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PART 1: Review Comments

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	**This is an important topic and I started reading the manuscript with interest. However, the author(s) were very ambitious in their efforts. They aimed to answered several research questions at a time and this resulted in failing to answer each of them properly. The title, abstract and conclusions are not well related. I highly recommend that the author(s) sit back and check what they want to do and what they did. In another document I provided detailed comments.**	
Is the title of the article suitable? (If not please suggest an alternative title)	**No**	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	**There are several lines in the abstract explaining the material and methods. I recommend to add more of the results. The authors need to make it clear what their main finding are. Are they validating the model or they want to understand impact of changing different parameters on the emissions and crop yields.**	
Are subsections and structure of the manuscript appropriate?	**No**	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.	**Please see the other document I prepared.**	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. -	**No**	

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Minor REVISION comments **Is the language/English quality of the article suitable for scholarly communications?**	No	
Optional/General comments	The manuscript will benefit from adding references to the statements mentioned throughout the manuscript. The manuscript will benefit from restricting and rephrasing sentences. It is not clear that the author(s) aimed to either test the models or check how different parameters impact on emissions. It seems there are several research questions and the author(s) tried to answer all of them in this manuscript. This is ambitious, however it makes the manuscript unclear and hard to follow. It is recommended to either clearly separate these goals or write different articles accordingly. While in the abstract it can be inferred that the author(s) studied impact of parameters on the emissions, in the conclusion it can be understood that they aimed to test the model. The author(s) used different units for the results which makes it difficult to compare the field-experiments with the results of simulations. The manuscript will benefit from comparing results from this study to other studies and discuss sources of differences. The lines of the manuscript were not numbered which is of issue for the reviewing process both for the author (s) and reviewer (s). Below I provided comments with accordance with the copied sentence from the manuscript. Please consider numbering the lines in the manuscript for further submissions. Abstract ***Manuscript***: "Research studies reported that mid-season drainage reduced CH_4 emissions by 60 per cent." ***Comment***: Other studies have shown that the mid-season drainage impact methane emissions reduction from 7-95% which is very wide range. It reduces the methane emissions but other parameters are also involved in. See this: https://www.ctc-n.org/technologies/mid-season- drainage-rice Did you consider when is the best to drain and what are the other parameters to gain the maximum methane emissions reduction? Does the mid-season drainage influence the crop yield? **Introd uction** **Sentences in the introduction are trivial and those need to be improved and supported with references. The paragraphs are not well connected, the author (s) can improve structuring the introduction and connection between the paragraphs** **Manuscript**: "Both these species are radiatively active." **Comment: what does it mean that these two species are active?** **Manuscript**: "However, the range in this estimate is wide (20-100 Tg yr^{-1}), largely due to uncertainties in estimates of CH_4 emission under a variety of environmental and agronomic conditions." **Comment**: does the methane emissions from rice paddies are dependent on rice varieties? Please elaborate in the manuscript with relevant references accordingly. **Manuscript**: "In general no till or reduced tillage in comparison to conventional tillage results in	

	lower CO_2 emission and greater CO_2 sequestration in soil [6]." **Comment**: In another study, it is stated that zero tillage resulted in methane emissions reduction but increased nitrous oxide emissions. Do you think that increase in nitrous oxide offset the benefit of methane emission reduction? **Manuscript**: "Water management is a most important factor for CH_4 emission from rice fields [7]." **Comment**: Please elaborate the main factors with ranking with support of more references. **Manuscript**: "Anoxic condition and flooding favored methane release." **Comment**: This is trivial. Please also use relevant references. This sentence can be rephrased. **Manuscript**: "Therefore appropriate drainage and drying significantly reduced CH_4 emission [8]." **Comment**: The author(s) need to also consider impact of crop yield once a parameter is changed to reduce emissions. **Manuscript**: "Many studies proved that the mid-season drainage, entailing purposeful drainage and subsequent field drying for around ten days at the later tillering stage could increase the productive tillering volume and rice yields [9] and the soil drying after the milk ripening stage will prevent the delayed ripening." **Comment**: While it is stated that 'many studies' showed the impact of mid-season drainage on the emissions reduction, only one reference is placed. **Manuscript**: "Nitrogen fertilizer applied in the form of ammonium sulphate reduces the CH_4 emission." **Comment please add references here** **Manuscript**: "Due to the application sulphur, sulphur oxidizing bacteria are grown in turn reduce the population of methanotrophs (as both organism use same substrate (SO_4^{-2}) as electron donor there is a co-exisistence between two)." **Comment**: Please rephrase. **Manuscript**: "DNDC is a comprehensive biogeochemistry model that simulates crop growth and soil C and N dynamics based on input data on soil properties, climate, and farming practices [11]." **Comment**: The beginning of this paragraph is very different than previous paragraph. This needs to be improved throughout the manuscript. Abbreviaitons need to be spelled out mentioned for the first time outside the abstract. Material and me thods The sentence order in this sentence can be improved. And further explanation can be provided to make this section clear. This section will benefit from separating the field experiment and modelling parts. **Manuscript**: "The observed weather parameters for the year 2012 and 2013 were used for	

this study."

Comment: why did you choose the weather conditions from 2012 and 2013? Is this relevant to the time when field experiments were conducted? When did you have your field experiments?

Manuscript: "Cropping sequence was taken for two consecutive years."

Comment: which two consecutive years?

Manuscript: "Two water management practices, continuous flooding and continuous flooding with mid-term drainage on 45^{th} to 55^{th} DAT and 65^{th} to 75^{th} DAT were examined for its efficacy to mitigating greenhouse gases as well as water use efficiency."

Comment: what is DAT? Please spell out.

Results and Discussion

Manuscript: "The observed emission of CH_4 during the growing season was 48-91.69 mg m^{-2} day^{-1}, while the simulated emission was 65.09-6.71 kg C ha^{-1} yr^{-1}."

please compare and discuss these results with other studies. For example, the results from your study are very different from reported emissions in this Liu et al. (2023). : The DNDC model simulated that the continuous flooding irrigation produced lower rice yield than the intermittent irrigations (Table 3 and Figure 3). Longer the drainage period for 4 days and 3 days flooding treatment seemed to produce more rice yield by the DNDC model. A similar trend in yields and CH_4 emission is found in the pot experiments [15].
Comment: This paragraph does not explain the figure 3 and table 3. Please explain in a clear and transparent way. What does happen at T7? Please use same units for the emission.

Co nclusion

It is not clear to me what the purpose of your study was. Testing a model or checking the impact of changing the parameters on the emissions.

Tab les

Table 1 and Figure 1 are showing same results. This is repeated, please keep one which gives the numbers in a clear and easy-to-follow way. Similarly Table 3 and Figure 3 are the same, please keep one, maybe the figure is better to keep.

References

Liu, X., Dai, X., Yang, F., Meng, S., Wang, H., CH4 emissions from a double-cropping rice field in subtropical China over seven years, Agricultural and Forest Meteorology, 339, h t t ps ://doi.org /10.1016/j.ag rfor met .2023.109578 , 2023.

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PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

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