Author's response file on comments on bg-2021-28 by anonymous refree#1

I am pleased with the author's response to my earlier comments. I think the manuscript is significantly improved. However, I still have a few specific suggestions below for authors, so the paper will be impactful. Once the authors have addressed these comments, I think the manuscript is about ready to be accepted.

Author's response: We thank anonymous referee#1 for constructive feedback and for highlighting the improvement in the quality of the revised manuscript. The received recommendations were carefully considered and incorporated into the current version of the manuscript. A point-by-point response to comments was given below. Please note that line numbers in the author's response refer to line numbers in the revised manuscript. And changes made in the original manuscript were highlighted in yellow.

1. Please consider double-checking and improve all intext referencing following journal style. I found some of them are not consistent.

Author's response: We have carefully checked all references and aligned them with journal-style with consistency.

2. I think that authors need to add a few sentences highlighting the limitations of this study somewhere in the methods or discussions, particularly regarding sampling replicates. I know that the authors have addressed my previous comment regarding time, safety and funding limitations to perform robust spatial and temporal GHG measurement replicates. Describing limitations in the methods section will not downgrade your paper; as an ecologist, we know how hard to work in wetland ecosystems.

Author's response: We have described the study limitations in the methods section:
Lines 159-163: For annual cumulative soil GHG flux calculations from coastal wetlands, we used GHG fluxes measured during low tide; therefore, our values did not incorporate the effect of tidal fluctuations. The spatial and temporal replication of this study targeted spatial variation within soil type (< 50 cm, five chambers), days (three days per sampling) and seasons (three seasons per year). However, our replication within land use and wetland type was limited; thus, generalisations for all wetlands and land uses should be done acknowledging this limitation.

3. Lines 159: Please add a unit for "Seasonal cumulative GHG fluxes" in Equation 1. For this equation, I also wonder if the authors could provide clarification regarding the incorporation of the tidal factor for cumulative GHG calculations. Please note that sampling was done during low tides only as described in line 131, particularly for CO2 and N2O in samples coastal wetlands.

Author's response: The suggested units were added in Equation 2 and clarification about GHG flux measurement in low tide were made as following: L159-154.

$$\text{Seasonal cumulative GHG fluxes (mg or µg m} - \text{2 yr} - \text{1)} = \sum_{i=1}^{n} (\text{Ri} \times 24 \times \text{Di} \times 17.38)$$

Equation 2

Where;

Ri = Gas emission rate (mg m^{-2} hr^{-1} for CO_2 and µg m^{-2} hr^{-1} for CH_4 and N_2O) during low tide

Di = Mean daily GHG emission rate in a season, (mg m^{-2} d^{-1} for CO_2 and µg m^{-2} d^{-1} for CH_4 and N_2O)

17.38 = number of weeks in each season, assuming these conditions were representative of the annual cycle (see Table 1). 2

4. Section 3.3: put comma after R2, p-value, and n.

Author's Response: Section 3.3 was revised according to the recommendation.

5. Line 279-290: This is a really good paragraph to compare the authors' findings with the measurements elsewhere. However, it may be hard to understand for non-technical readers. I suggest authors add publishes numbers from a quick literature survey and 2013 IPPC wetlands supplement and compile them (including GHG numbers in this study) in the summary table. This Table will be useful to connect these study findings with the next policy implication discussion in Section 4.1. The Table should present GHG data along with their 95% CI (common uncertainty used by IPCC) and sample size (n).

Author's response: The following literature review table was added as suggested and text in the paragraph was modified accordingly as following:

L281-284 and L295-298: The fluxes measured in the coastal wetlands of this study, -1191 to 10,970 mg m^{-2} d^{-1} for CO_2, -0.3 to 3.9 mg m^{-2} d^{-1} for CH_4, and -0.2 to 2.8 mg m^{-2} d^{-1} for N_2O, were within the range of those measured in other subtropical/tropical wetlands, worldwide (Table 3). For CO_2, fluxes can range between 44 and 11,328 mg m^{-2} d^{-1}, for CH_4, from 0.03 to 1255 mg m^{-2} d^{-1} and for N_2O, from 0.1 to 279 mg m^{-2} d^{-1} (Table 3). Despite being in tropical regions, GHG fluxes from this study were lower compared to other climates (Table 3).

Table: 3. Comparison of GHG fluxes (mg m^{-2} d^{-1}) from literature review with the rates reported in this study

Reference	Climate	Country	Ecosystem	CO_2 fluxes	CH_4 fluxes	N_2O fluxes
Allen et al., 2011	Subtropical	Australia	Mangroves estuary	-	1.5-51	-
Cabezas et al., 2018	Subtropical	USA	Mangroves estuary	-	0.3-2.2	-
Li and Mitsch, 2016	Subtropical	USA	Flooded brackish marsh	-	212 ± 51	-
Morse, Ardón and Bernhardt, 2012	Subtropical	USA	Forested wetlands	7224-11328	118-1255	46-279
Musenze et al., 2014	Subtropical	Australia	Mangroves estuary	-	5-448	0.1-3.4
Whiting and Chanton, 2001	Subtropical	USA	Typha marsh	409-477	189-264	-
Mitsch et al., 201	Tropical	South Africa	Seasonally flooded wetland	-	264±29	-

Krithika et al., 2008	Tropical	India	Mangroves	-	25-50	-
Kristensen et al., 2008	Tropical	Tanzania	Mangroves	44-3521	1.9-6.5	-
Biswas et al., 2007	Tropical	India	Mangroves estuary	-	0.03-2.16	-
Purvaja et al., 2004	Tropical	India	Mangroves estuary	-	10-85	-
Kreuzwieser et al., 2003	Tropical	Australia	Mangroves	-	0.6-11	-
Kiese and Butterbach-Bahl, 2002	Tropical	Australia	Tropical rain forest	2208-3288		1.9-3.2
Purvaja and Ramesh, 2000	Tropical	India	Mangroves	-	63-434	-
Sotomayor et al. 1994	Tropical	Puerto Rica	Mangroves	-	5-110	-
Barnes et al., 2006	Tropical	India	Mangroves	-	9-15	-
Melling et al. 2012	Tropical	Malaysia	Peat swamp forest	3384	21-29	
This study	Tropical	Australia	Freshwater tidal forest	1640-10970	0.16-0.59	-0.19-0.7
This study	Tropical	Australia	Saltmarsh	-594-(-1191)	-0.25-0.12	-0.22-2.76
This study	Tropical	Australia	Mangroves	2852-5669	0.44-3.95	0.04-0.16

Oertel et al., 2016	(Sub) Tropical	Global	Wetlands	-	-1.08-1169	-
Oertel et al., 2016	Temperate	Global	Wetlands	-	-1.49-1510	-
Oertel et al., 2016	Mediterranean	Global	Wetlands	-	-	-2.6-9.4
Al-Haj and Fulweiler, 2020	-	Global	Mangroves	-	-1.1-1169	-0.2-6.3
Al-Haj and Fulweiler, 2020	-	Global	Saltmarshes	6844-34983	0.38-3002	-7.39-28.52
Rosentreter et al., 2021	-	Global	Mangroves	4563-30800	-0.69-10.78	-1.69-4.65
Rosentreter et al., 2021	-	Global	Saltmarshes	3802-20914	107-168	4.96
IPCC 2013	Tropical	Global	Swamp forests		30.76-2149	

Note: Hyphen means no data was available; GHG fluxes as CO_2-C, CH_4-C and N_2O-N were multiplied by 3.66, 1.34 and 1.57 respectively to calculate CO_2, CH_4 and N_2O fluxes (National Greenhouse Accounts Factors, Australian Government Department of Industry, Science, Energy and Resources. 2020).

6. Supplement Table 1S: I suggest authors provide sampling dates for their raw data.

Author's response: We submitted the revised for their raw data with sampling dates includes.

Responses to the Comments from refree#2

Dear Authors. Thank you for the revised manuscript. I found that you have done a thorough job. I have a few further recommendations.

Author's response: We thank the Anonymous referee#2 for useful recommendations and

We have included a point-by-point response to comments raised by the reviewer, and a revised manuscript has been submitted.

1. At the moment you report some results on the GHGs in your methods section. I recommended that you change this so that the results are presented in the results section.

Author's Response: We moved the result reporting text to the results section as following:

L210-215. We found that CH_4 fluxes did not significantly vary between the low and high tide within all coastal wetlands. Contrarily, for saltmarsh, CO_2 was taken during the high tide (1.12 ± 0.24 g m^{-2} d^{-1}) but emitted (0.69 ± 0.4 g m^{-2} d^{-1}) during the low tide ($F_{1,28}$ = 20.06, p < 0.001). Finally, for N_2O, fluxes differed in all coastal wetlands, with higher uptakes in the high tide for mangroves ($F_{1,28}$ = 38.28, p < 0.001; $F_{1,28}$ = 13.53, p = 0.001) and higher release for saltmarsh ($F_{1,28}$ = 38.31, p < 0.001) during low tide (Table S4). These results suggested that for CO_2 and N_2O fluxes, there was a probability of variation depending on the time of sampling.

2. You mention that you sample in five locations at each site and that your aim was to assess small scale variability. I could not find an evaluation of the small scale variability apart from SEs reported, so I am not sure how this is brought to the paper. I also could not find the details of the distance between the sampling points within each location. I think that this is important that needs to be included as it will help the readers to understand how the variability you found relates to the spatial distribution of your sampling points. I also think it would be valuable for the reader to understand how you selected your sampling points within each site, i.e. how did you do your randomisation of the selected points within site, taking into account your logistical constraints.

Author's Response: Please refer to the following text:

L77: The natural coastal wetlands and the sugarcane site were located within the same property at Insulator Creek and w**ere located < 200 m apart** (Fig. 1B), while the ponded pasture was 20 km north at Mungalla Station (Fig. 1A)

L132: Five chambers were set ~ 5cm deep in the soil separated **one to two meters** from each other selectively located on soil with minimal vegetation, roots, and crab burrows.

3. Also, I found a few places where the sentences where not quite right (e.g. no capital at the start of a sentence) so I recommend that you proof read the revised text to remove such small mistakes.

Author's Response: We proofread the manuscript to remove the mistakes.