

## ***Interactive comment on “Methane and nitrous oxide sources and emissions in a subtropical freshwater reservoir, south east Queensland, Australia” by K. Sturm et al.***

### **Anonymous Referee #2**

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This paper reports original data of methane and N<sub>2</sub>O sources and emissions from a subtropical reservoir. GHG emission from lakes and reservoirs is an important topic and more data need to be produced, especially in the subtropical systems where there is a lack of data. However, I believe the authors were unable to translate the message they want to convey considering the database they have. There is a gap in both spatial and temporal scales and the manuscript could be improved considering the collection of more data. Additional information is needed regarding methods section, especially about the chamber measurement, the k value and the wind speed measurements. I cannot recommend the publication of the paper in the form it is presented. See below some specific comments.

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#### Specific Comments:

##### Materials and metidos

There is a gap in this manuscript related to the spatial and temporal variability of CH<sub>4</sub> and N<sub>2</sub>O production and emission. The results are based only in two stations and five days of measurements in one single month. I don't agree that it is enough for a subtropical system with 19 ha. Moreover, the authors used anchored surface floating chambers to capture methane emission by bubble and diffusion over 5 consecutive days sampling every 24 hours. After many hours the air inside the chamber can be oversaturated, reducing the real flux. What did the authors do to avoid the oversaturation inside the chamber? The authors also need to discuss the implication of the turbulence created by an anchored chamber, which can disturb the real flux. I also recommend the authors to avoid using “GHG source and emission”, since they did not measure CO<sub>2</sub>.

Flux measurements – how do the authors estimate the k values? Reference is missing here. Moreover, how was the wind measured? The authors should present the wind data or at least mention if the wind was constant during five days.

How did the authors get the reservoirs storage curve?

Statistical Analyses – The authors use one-way analysis of variances (ANOVAS) to evaluate differences between sampling sites and sampling days. One of the assumptions of this analysis is that samples are independent which is the case.

Results - Are CH<sub>4</sub> results shown in mgCH<sub>4</sub> m<sup>-2</sup> d<sup>-1</sup> or mg C-CH<sub>4</sub> m<sup>-2</sup> d<sup>-1</sup>? What about the N<sub>2</sub>O units? Moreover, fluxes are in mg m<sup>-2</sup> d<sup>-1</sup> while the concentrations are in nmol L<sup>-1</sup>. I recommend using the same unit throughout the text. What was the relationship between the wind speed and the CH<sub>4</sub> diffusive emission? Can the wind speed explain the lower contribution of CH<sub>4</sub> diffusive emission?

Discussion - The discussion is incomplete and some data reported in the results sec-

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tion are not in the discussion. For example the variation in nitrite and nitrate over the sediment incubation time.

The discussion about the findings of Green et al. 2012 is unnecessary.

Minor correntios:

Abstract - Page 1 Line 7 – The reservoir was a net source since waters were supersaturated with CH<sub>4</sub> and N<sub>2</sub>O – Please, avoid the word “net” and consider to say that the reservoir was a source.

Page 19494, lines 18 – 24 – Please considerer to rewrite the sentence in order to make it clearer. Page 19495, line 7 and 15-17 – how did the authors test the differences between reservoir layers? It is not in the methods section. If one-way ANOVA was used, check if the sample can be considered as independent samples. Page 19495, line 25 – It seems to be a mistake, but in the text the authors mentioned that zero oxygen concentration was found after 48 hours. In the figure 5a after 48 hours the oxygen is still higher than 75  $\mu\text{mol L}^{-1}$  and the concentration was zero after  $\sim 100$  hours. Is the text wrong? Page 19495, line 5 and 6 – “main contributor” is written twice. Please, check it. Page 19495, line 9 – A period is missing. On table 1 the authors present the range of methane emission rates from different reservoirs, but the unit is  $\text{mgCO}_2 \text{ m}^{-2} \text{ d}^{-2}$ . Should the unit be  $\text{mgCO}_2 \text{eq m}^{-2} \text{ d}^{-1}$ ?

Reference - Please check the reference section - the references Beutel et al. 2008 and Mendonça et al. 2012 used here are not cited in the text.

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