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Interactive comment on "Biogeochemical diversity and hot moments of GHG emissions from shallow alkaline lakes in the Pantanal of Nhecolândia, Brazil" *by* Laurent Barbiero et al.

Anonymous Referee #1

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In theory the topic of this manuscript is good since it describes GHG fluxes in a less studies tropical wetland with considerable size. However, the paper is so poorly presented that it is even difficult to tell what has been done. Partly the problems of the paper are due to the language used and the paper will definitely benefit from language checking. The authors themselves say that this is a work providing preliminary results and that is true; the work is quite descriptive and superficial. It is unclear how this present study makes a substantial contribution in Pantanal GHG studies. The main problem is in the study design, especially the gas emission studies. After reading the manuscript several times, I still don't know how many times the gas measurements were carried out. In methods section there is no indication about dates, time etc. of

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sampling. According to the figures the gas samples were taken 10 times per day on days when the systems were sampled. In Table 1 there is only sampling month, no dates. Without that information, it is impossible to judge the quality of the research. The studied systems appeared very shallow and thus they most probably are hot spots for ebullition, but ebullition was not studied at all (although it is discussed quite a lot). I find it very surprising that ebullition was ignored. From chambers the samples were drawn only at the beginning and in the end of the measuring period – which as such is strange – so the ebullition is included in the results, but in a proper study you should still measure it separately. The authors are well aware of the importance of hydrology and thus weather for their study system, but there is nothing about these basic measurements indicating that they were not monitored at all during the study period. When discussing the results, the importance of evaporation for gas fluxes is clearly stated, but despite this, heat fluxes were not measured during the study. The same applies to meteorological data in general – no measurements. There is no explanation for the selection of studies lakes, i.e. why only one freshwater lake was chosen. There is very limited background data on the lakes. It is said that the lakes are shallow, but no bathymetric maps are available. The surface area of the lakes is not presented and cannot be estimated from figure 1, since in the aerial photographs there is no scale. In general, no information about the morphometry of the lakes is available. The lakes are divided into two classes, green and black lakes, but it left unclear where the name especially of the black lakes comes from. Are they dark coloured due to DOC loading? No explanation is given for the fact that only three lakes were chosen for the sediment studies. Why these three? There are several smaller issues in methods, which require further pondering. For instance, the lakes were sampled for gas concentrations in the water, but nothing is said about the location of these sampling points and sampling depths. Temperatures were measured inside and outside of the chambers but it is not explained how these data were used. The calculations of fluxes were not explained. It is said that oxidation-reduction potential was measured also in the water (why?), not only in the sediment. These results are not shown. Nothing is said about the calibra-

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tion of the fluorometer. In the results section those parts, which presumably refer to 'Biogeochemical diversity', are fairly superficial and in fact describe the basic limnology of the systems. The size of the gas bubbles is given, but it is totally unclear how the bubble studies were made. The gas emission part of results is not well structured, and needs to be rewritten to clarify the findings. In discussion gas bubbles and especially microbubbles are emphasized. However, bubbles were not studied at all and thus there is no evidence on these phenomena in the Pantanal small lakes. The advice is to be very cautious when discussing bubbles. There is also a section for the influence of rainfall. Similarly to bubbles, no information on rainfall or weather in general, so there is no proper ground for this kind of discussion. There are lots of typos and poor language. Besides gas emission part of the results section, at least the section 'studied area' should be restructured and divided at least to two paragraphs.

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