Biogeosciences Discuss., 7, C3868–C3872, 2010
www.biogeosciences-discuss.net/7/C3868/2010/

Biogeosciences Discussions

Interactive comment on "Influence of niche differentiation on the abundance of methanogenic archaea and methane production potential in natural wetland ecosystems across China" *by* D. Liu et al.

Anonymous Referee #2

Received and published: 18 November 2010

General

Since decades scientists have been interested in the topic of wetland CH4 emissions. The multitude of wetland types and their complexity makes it sometimes difficult to account for all CH4 sources, their importance and role in the total global budget. It is very important to understand the processes and behaviour of methanogenic bacteria influencing the potential of CH4 production from wetlands and to understand how this affects the emissions. The present work represents a good attempt in investigating the factors and differences which may lead to increased emission potential taking into

account different climatic regions, wetland types and behavior of methanogenic bacteria. Due to the multitude of wetland types, vegetation classes and climates (hydrology and temperature), all important factors influencing the CH4 emissions, I agree with applying in situ experiments to replicating the real ecosystem conditions and bacterial behaviour. I recommend the publication of this paper after going through the listed comments.

Specific comments

Please be consistent with using CH4 / methane.

Title

I would recommend a shorter title such as: Relation between methanogenic archaea and methane production potential in natural wetland ecosystems across China.

Abstract

The aim of this paper is not very clear formulated within the first paragraph of the paper. Please state which are the main objectives before getting into the details of site description and methodology.

The last two paragraphs are too descriptive, rewrite a shorter and clear conclusion and main findings of the study: we conclude that CH4 production potential. . .

Page 7630 Line 1-2: spatial variability in which context, related to what factors? Line 5: vertical soil profiles First two paragraphs: you mention after each wetland site the climate zone, which one belongs to the Qinghai-Tibetan Plateau? Due to the altitude of the plateau would be classified perhaps as desert boreal/arctic zone? Line 24: rather than temperature Line 24: is mainly affected (be consistent with using the present or past tense) Line 25: stability of the water table

Introduction

The introduction is generally well structured. I would recommend a more detailed ref-

erence list especially for the lines 5-10 “up to date, many studies. . .”. The following references and related articles (with references therein) which focused on CH4 emissions from wetlands might be of interest: T.R. Christensen et al 1993, 1996, 2003 etc; P.M. Crill et al., 1988; Walter and Heimann 2000,2001a,b; Reeburgh and Whalen, 1992; Petrescu et al., 2008, 2010; Cavicchioli 2006; Frolking, 2007; Rivkina et al., 2007 etc.

Page 7631 Lines 5-10: The following sentence: “However, there is great uncertainty in the magnitude and distribution of methane sources on the regional, national, and continental scales because of the large spatial and temporal variations in emissions across individual wetlands and wetland types”. I would reformulate: “However, there is great uncertainty in the magnitude and distribution of methane sources from regional to global scales because of the large spatial and temporal variations in emissions across individual wetland types”. Line 11: please have a look in Walter and Heimann 2000 for a very detailed overview on factors influencing the CH4 emissions.

Page 7632 line 11: “We have examined. . .potential and methanogenic population. . .”

Material and methods:

Good experimental approach and description of the methodology. Please have a look at Yurova et al., 2008 for DOC

Pages 7632-7633: Add after m (meters) a.s.l. in line 23 and 11, 16 respectively.

Page 7633: Lines 1-5: “In the C. lasiocarpa marsh, vegetation is 90% covered by C. lasiocarpa and 10% covered by Glyceria spiculosa, with the profile composed of standing water layer, root layer, peat layer, and grey soil layer – reformulate sentence as: “Vegetation in the C lasiocarpa marsh is composed of 90% C lasiocarpa and 10 % Glyceria spiculosa. The soil profile is composed of standing water, root layer, peat layer and grey soil layer”.

Line 10: “Ruoergai highlight is, however, up to 3400 m, resulting in the little

annual. . .“change with: “Ruoergai highland riches 3400 m a.s.l. and shows little annual. . .”

Line 13: You talk about low and high average monthly temperature but you don’t mention the year when these were taken. Is it 2009 same as the sampling? Line 28: Soil samples. . .

Results

Page 7636 line 15: “Soil properties of different natural wetlands are shown in Table 1”. From this sentence one would understand that you talk about all wetlands in general. Please refer to the ones present in your study. You may say: In Table 1 we present the site characteristics and soil properties of the 5 wetlands in study. Same thing for line 18: . . .of other wetlands. . .

Page 7637 Line 4: DOC concentration was measured in the. . . Line 5: lowest in the.. Point 3.2: You present figures for the top 30 cm of CH4 production as temperature related and in Figure 3 the relationship between CH4 production potential of the top soil layer and incubation temperature. I would be very interested if you could also show a similar figure for the water table depth or even better showing how T, WT and CH4 (and/or microbial populations) are correlated at each site Line 24: “marsh, and was 665. . .” Line 25: give the lowest value for the Ruoergai peatland

Page 7638 Line 2: . . .to the other wetlands counting 8.29. . .weather the lowest was measured in the Poyang . . . Line 21: . . .to the top layer for all the samples”

Page 7639 Line 1: growing season Line 2: You already jump to conclusions. Please reformulate: In this study we show that... Line 5. You refer to Ding et al 2004 for similar results: how about comparisons with studies from US, Canada, Russia for same type of vegetation wetland and climate?

Page 7640 Line 3: for R2 be consistent throughout the paper how many decimals you use. . .I see 2, sometimes 3. . .I would suggest to keep in round with 2 decimals.

Line14-16: intermittently inundated wetlands such as the Poyang wetland may not be a hot source of atmospheric CH4 compared to permanently inundated Sanjiang Plain marsh in China

What might be the reason? Many studies have found that water table fluctuations between +1 and -10 cm in a short period of time enhance the CH4 emissions. During the summer showers when the WT rises and floods occur, the wetlands become hot spots for CH4 (high picks are observed). Is this the case for any of the 5 wetlands? Page 7641 Line 16: oxidation, while C. . .

Conclusions

You mention that the production potential increases with latitude. Please give examples of other studies which have a similar conclusion and explain why. What is the difference between a low-high latitude wetland? You also conclude about the position and stability of the water table. You did not discuss much on this topic, please refer to other studies and relate your findings to it.

Line 7: . . .affected by temperature and depends on the supply of substrates. . .

Figure captions

Fig.1. Change: Location of the four study sites in China.

Interactive comment on Biogeosciences Discuss., 7, 7629, 2010.