

## ***Interactive comment on* “Sulfate deprivation triggers high methane production in a disturbed and rewetted coastal peatland” by Franziska Koebisch et al.**

### **Anonymous Referee #2**

Received and published: 29 December 2018

The manuscript "Sulfate deprivation triggers high methane production in a disturbed and rewetted coastal peatland" by Koebisch et al. is very interesting and informative. The effect of dyking and freshwater rewetting on S and C transformation of a peatland has been studied using various analysis methods. The authors studied four spots with different solid S and sulfate concentrations and discussed the sulfate reduction and CH<sub>4</sub> production and consumption among these sites. They conclude that a replenishment of marine water to dyked wetlands would reduce methane emissions.

### **Abstract:**

Lines 30-32, the word of “suppression” is not accurate since results showed “high con-

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tents of labile iron minerals and dissolved ferrous iron at depth of spot 2, coincided with a high abundance of Thermodesulfovibrionaceae at concurrently minor occurrence of Deltaproteobacteria. (402-404)".

Lines 34-36: Is that useful to re-exposure of dyked wetlands to natural coastal dynamics since high amounts of sulfate did not interfere with high methane emissions on ecosystem scale?

Introduction

Lines 46-47: "dissimilatory sulfate reduction of dissolved organic matter (DSR)" changed to "dissimilatory sulfate reduction (DSR) of dissolved organic matter".

Line 63: Wrong left parenthesis. {Wen & Unger, 2018}.

Line 75: Lack of "."

Material and Methods

Lines 105-107: Please check the parenthesis and should not be set in italic.

Line 159: Please define the abbreviation of DOC. It seems that the results of stable carbon isotope ratio of DOC was not presented in the result or discussion.

Line 160: Ertl and Spitzky (2004), not list in the Reference. Please check the manuscript completely.

Lines 168, 285, 308: Böttcher et al. (2007), not list in the Reference. Please check the manuscript completely.

Line 185: Please clarify DNA or RNA? Since only DNA has been extracted from samples, hence, I suggest to delete RNA.

Line 191: Please define the abbreviation of AVS. e.g. (acid volatile sulfur).

Lines 196-199: What's the meaning of "reactive iron"? How to detect the dissolved Fe and the valence of Fe (Fe(II) or (Fe(III)))? Line 200 indicated the extracted iron fraction

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consists of iron(III) oxyhydroxides and iron(II) monosulfides, was the dissolved Fe(II) also existed (Heronet al., 1994. Speciation of Fe(II) and Fe(III) in contaminated aquifer sediments using chemical extraction techniques. Environmental Science & Technology, 28(9), 1698-705.)? The reference of Canfield, 1989 was not list, please check.

Line 200: Stookey (1970), not list in the Reference.

Line 223: "Sequence raw reads" changed to "Raw sequence reads".

Lines 229-230: Clarify the number of the sequence. 18.500 or 18,500? 12.500 or 12,500?

## Results

Lines 240-241: Lack of "). Please check the manuscript completely.

Lines 271-272: What's the detailed detection method of organic-bond S and where is the data of organic-bond S? Is it in the Figure 4 or TABLE A1? The note in the Figure 4 indicated that the solid residual S fraction is suggested to present primarily organic-bond S. However, the content (0.2 to 1.6%dwt) in spot 1 (lines 271-272) seems inconsistent with Figure 4b (far less than 1%dwt). What's the relationship between TABLE A1 and Figure 4 and 5ijj§

Lines 291, 322: Similar question to the line 271-272. Table A1 seems to address the organic-bond S content (0.2 to 1.6 %dwt). What's the difference between orgS in Table A1 and solid residual S in Figure 4b? Please clarify.

Lines 298-299 and 392-393: It seems inconsistent to Figure 4a. In the figure, the 1 mM sulfate concentration was appeared at 60cmbsf of spot 3, however, the relative abundance of Chloroflexi was missed at 60cmbsf of spot 3. Please clarify.

Lines 331-332: How to understand the role of DIC in methane production and consumption?

Line 340: Whiticar (1986), not list in the Reference. Please check.

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Line 360: "acceptor" changed to "acceptors".

Discussion

Line 394: "dsrAB" should be italicized.

Line 439: Please define the abbreviation of AOM-SR.

Lines 447-448: In the Figure 7, the obvious increase of  $\delta^{13}\text{C-CH}_4$  and  $\delta\text{D-CH}_4$  ratios were appeared at 50 cmsf of spot 1, however, the relative abundance of methanotrophy was missed at 50 cmsf, hence, how to understand this sentence.

Lines 452-453: Why high sulfate concentration did not interfere with methane production?

TABLE A1

Table A1: TS concentrations were inconsistent with dry weight ratios of TS. e.g. why the value of TS percentage is not 0 while TS concentration is 0. What is the meaning of orgS? Ionic valence should be added e.g.  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{Na}^+$ .

Reference

The format of the references should be carefully checked. Non-English language appeared e.g. lines 504-506, 523-524, 602-603. No journal e.g. lines 507-508, 566. Capitalize the first word of journal or not e.g. lines 548, 568, 573, 577. Other format errors in lines e.g. 523-524, 537-538, 546, 585, 624, 628.

FIGURES

Figure 2: Lines 645-646, please rewrite this sentence.

Figure 4: Please unify the formats with Figure 7. e.g.  $\text{mmol l}^{-1}$  in Figure 4 while mM in Figure 7. e.g. the name of y-coordinate...

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