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Comment

## ***Interactive comment on “Effect of peat quality on microbial greenhouse gas formation in an acidic fen” by M. Reiche et al.***

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1. Does the paper address relevant scientific questions within the scope of BG? Yes 2. Does the paper present novel concepts, ideas, tools, or data? Yes 3. Are substantial conclusions reached? Yes 4. Are the scientific methods and assumptions valid and clearly outlined? Yes 5. Are the results sufficient to support the interpretations and conclusions? Yes 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes 8. Does the title clearly reflect the contents of the paper? Yes 9. Does the abstract provide a concise and complete summary? Yes 10. Is the overall presentation well structured and clear? Yes 11. Is the language fluent

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and precise? Yes 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Clarified, extended 14. Are the number and quality of references appropriate? Yes 15. Is the amount and quality of supplementary material appropriate? Yes

Overall quality The paper presents a method for explaining and prediction the potential for anaerobic CO<sub>2</sub> and CH<sub>4</sub> production in peat soil, which is a highly relevant topic. In general, the paper is well prepared and only minor revisions are recommended.

### Specific comments

#### 2.1. Peat sampling

Page 8779, line 13-16: The degree of humification has been given an only general description: H6-7 for sites C2 and D2 and H3-5 for sites sD1 and M. If available, degree of humification should be presented for every horizon of the four sites, e.g. in Table 2.

3.1 Chemical properties of peat Page 8782, line 3-12: The sequence of parameters commented could be changed: C content, H content and Loss of ignition (LOI) are of cause well correlated in organic soil and will show the same pattern with depth. In fact, LOI is frequently used to estimate the SOM content in soil. 3.2 Microbial formation of CO<sub>2</sub> and CH<sub>4</sub> Page 8783, line 5-6: The word “increase” should be replaced by “peaks” or “maximum values”. Page 8783, line 19-24: The sentence is unclear.

3.3 Peat quality Page 8785, line 3-7: The peat quality index should be presented in a table, e.g. in Table 3, not only in Figure 3, which shows the correlations between peat quality index and relevant parameters, and where the pattern between sites and depths are less predominant.

#### Other comments

The relationships between peat quality index and degree of humification (von Post classes) should be more discussed. It seems evident that the peat at sites sD1 and M

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were less humified, had the lowest von post classes (3-5), the highest CO<sub>2</sub> and CH<sub>4</sub> and formation in the depth 10-40 cm, and possibly also the highest peat quality index. Could the degree of humification give any indication on the potential for anaerobic CO<sub>2</sub> and CH<sub>4</sub> formation in peat soil?

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