

Interactive comment on “Uncertainties in modeling CH₄ emissions from northern wetlands in glacial climates: effect of hydrological model and CH₄ model structure” by C. Berrittella and J. van Huissteden

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General comments: We are pleased with the constructive comments of this referee and the overall judgment of the manuscript as a 'welcome contribution towards efforts of large scale modeling of CH₄ fluxes from northern wetlands'. Although the referee says that the paper is well structured and easy to follow, there are indeed several errors in the text, indicated as well. The detailed comments offered by the referee will be regarded as significant contribution during revision.

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Abstract

Will be corrected.

Introduction

Page 820: we agree with the addition suggested by the reviewer. Indeed, ice sheet configuration significantly differs during the last glacial from the modern situation, and it even has been suggested that melting ice sheets may have been an important source of CH₄ (Wadham et al., 2008).

Modeled climate changes

Page 826: This part will be corrected, indeed it should be 'stadial'. The sentence should read: 'modelled Modern emissions' and 'present-day measured emissions'.

Page 828: This part will be re-formulated to clarify the flux calculation. The map of modelled fluxes has the same resolution as that of the regional climate model. The wetlands map has the same resolution as the 30" digital elevation model from which it has been derived. From the digital elevation model a slope map has been calculated. From the slope map a wetlands map has been calculated using fuzzy classification on the slopes, assuming that all flat areas will have been dominated by wetlands. Next, the CH₄ flux is integrated over the wetlands map, using for each grid cell the corresponding flux from the modelled flux map.

Results

Page 829: The model reproduces seasonality; the fluxes were integrated over one year.

Page 830: The second 'formation' in the sentence should be 'oxidation'.

Discussion

Page 832: The Q10 factors for both CH₄ formation and oxidation influence the fluxes

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from all areas, since these Q10 factors influence the process rates of methane formation and consumption in the soil. It has no influence on the area of methane emissions.

Table 1, Figures and figure captions will be changed; their quality will be improved.

Reference

Wadham, J.L., M. Tranter, S. Tulaczyk, M. Sharp 2008. Subglacial methanogenesis: A potential climatic amplifier? *Global Biogeochemical Cycles*, 22, GB2021, doi:10.1029/2007GB002951.

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