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Interactive comment on “CH₄ and N₂O dynamics in the boreal forest–mire ecotone” by B. Ľupek et al.

Anonymous Referee #1

Received and published: 26 June 2014

Review of Tupek et al, 2014, BGD, 11, 8049–8084 CH₄ and N₂O dynamics in the boreal forest–mire ecotone

General comments: This paper examines the production of CH₄ and N₂O through a transitional landscape region commonly found in boreal environments. The paper uses the closed chamber method for 2–3 years over nine locations on an ecotone gradient. The paper finds minimal spatial patterns in N₂O due to the generally low fluxes while CH₄ fluxes tended to follow a soil-wetness gradient. The authors did not detect any evidence for “hot moment” fluxes of either gas and also found relatively stable fluxes from year-to-year despite different wetness conditions in these years. I found the paper well put-together and interesting in its presentation of the data. The paper helps to fill a gap in current knowledge of these common transitional landscapes. It cites many

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Interactive Discussion

Discussion Paper

interesting papers and helps to contextualize its results through a comparison to these other studies. I find the paper worth publishing in Biogeosciences after some revisions and additions to the content as detailed below.

Suggestions: The paper would benefit from a stronger description of site differences, including pH and CN ratios for the different landscape units. It seems that the pH is not measured with each flux estimate, which is a pity in such a study. Especially with a discussion of microbial communities and the lag-time in response to changing water tables, pH can be a particularly useful indicator of CH₄ production potential. If you have such data for the sites (it is unlikely to change so greatly through the year) it would be nice to see it. Likewise some information about the site CN ratios would be useful for understanding both CH₄ and N₂O fluxes.

The paper would benefit from a more complete time series of the fluxes for each site – something like Figure 2 for each gas flux (or another style of presenting this information – even the daily values). Otherwise it is hard to visualize how the time series may look, how seasonal and interannual shifts may or may not occur, etc., from only the flux-variable relationships in Figs 4 and 7 and the overviews in Figs 3 and 5. This new figure could indeed replace or supplement figures 3 and 5. Alternatively such a presentation could be given as a supplemental on-line figure.

Minor suggestions

Page 8050, Line 4 omit “the”

Page 8050, Line 20 “upscaling” Not “up scaling”

Page 8051, line 25 change richer to rich

Page 8052, line 24 promotes to promote

Page 8052, line 28 saturate to saturated

Page 8055, line 9: Model number? (and/or supply more details about column and

BGD

11, C2834–C2837, 2014

Interactive
Comment

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Interactive Discussion

Discussion Paper



mesh materials, gas flow rates and column temperature to allow for a reproducible study)

Page 8055, line 18: add “the” before “gas chromatograph”

Page 8056, line 21: remove the comma and “which” and replace with “that”

Page 8057, line 8: replace “case” with “observation”

Page 8058, line 5: replace “the” with “a”

Page 8059, line 18: add “the” before “forest floor”

Page 8061, line 9: change “like” to “as”

- Lines 10-11: “was for uplands. . .” change to “was relatively low for uplands (10%) and transitions (15%) and slightly higher for mires (22%).”

- Line 15: “fluxes” to “flux”

- Line 23: it would be nice to add the uncertainty range on the 18 cm estimate, as this parameter value is the type of result of particular interest to upscaling and larger, regional modeling studies (also the 14 oC result found in line 26)

Page 8062, line 10: change “momentarily” to “momentary”

- Line 12: move “lower” to immediately after “were”

Page 8063, line 11 add “m” after 450

- Line 13 change “whereas” to “Alternatively”

- Line 14 awkward start to the sentence – I suggest “we have complemented the few studies. . .” and “. . .have lowered the likelihood. . .”

Page 8065 the first paragraph needs more context and sign-posting to clarify that it introduces the following two paragraphs. Please improve the transitions & outlining on this page (perhaps “first, . . . “ and “second. . .” and more in this first paragraph).

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11, C2834–C2837, 2014

Interactive
Comment

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Interactive Discussion

Discussion Paper



- Line 21 do you mean “flark” instead of “flurk”?

Page 8066, Line 1: omit “with”

- Line 9, change “sometime” to “sometimes”, line 10 difference to differences.

Page 806, Line 2, remove parentheses from degrees-C

- Line 6, change “fast” to “quickly”

- Line 17, are you referring to a formal categorization system or emission-factor methodology? If not I suggest “considered”.

Page 8078, Fig 1: In caption B can you add the site numbers after xeric, etc., to indicate which categories belong with which sites?

Page 8080, Fig 3: It seems to me better to remove the VSR1 and mires data-axis labels from the inset boxes since they are not presented (but seem to have some flux observations within the range shown on these plots).

Interactive comment on Biogeosciences Discuss., 11, 8049, 2014.

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11, C2834–C2837, 2014

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