Authors' response to Editor's comments on "CH4 and N2O dynamics in the boreal forest–mire ecotone" by B. Ťupek et al., BGD, 11, 8049–8084, 2014,
boris.tupek@helsinki.fi, 11 December 2014

Please, find Editors comment proceed by "!" and our response proceeded by "#". symbol. Suggested text for the manuscript uses same font as our BGD paper.

Editor Decision: Publish subject to technical corrections (03 Dec 2014) by Donatella Zona

Comments to the Author:

Dear Authors,

I am glad to notice that your manuscript substantially improved and that you addressed my previous comments. I suggest some last corrections before final publication. ***# Thank you!***

! In the introduction there are still some concept not clearly explained: page 3 lines 1-3, please explain why this difference in the pH ranges and the processes behind this difference.

 # We clarified the processes behind pH range and variation:

Methane production potential in peat soils generally increases positively with pH (Juottonen et al. 2005, Ye et al. 2012), whereas CH_4 oxidation of forested peatlands has narrow pH optimum around 5.5 (Saari et al. 2004). Increased pH levels e.g. through the inflow of less acidic mineral soil water, typically containing greater calcium and bicarbonate concentrations than peat water, could increase CH_4 emissions from transitions (Howie and Meerveld 2011).

!In general, in the introduction it should be more clearly stated WHY we should be putting effort into quantifying these greenhouse gas emissions from forest-mire ecotones.

 # We clarified the reasons WHY to study GHG of forest-mire ecotones in the introduction.

However, the area of forest-mire transitions is relatively large, e.g. in Finland, forested mires with the organic horizon < 30 cm cover 1.5 million ha or approximately 7% of the total forest area (Finnish statistical yearbook of forestry 2013); and up to date it's not clear whether terrestrial-aquatic interfaces, such as the forest-mire transition, represents a biogeochemical hot spot of CH_4 and N_2O emissions (McClain et al. 2003).

!The manuscript could possibly be strengthened stressing out the importance and novelty of the study.

 # We added more focus on importance and novelty of our findings in the conclusions.

The novelty of this study is in affording better understanding of the boreal forest landscape biogeochemistry in particular the dynamics between soil water content and CH_4 and N_2O fluxes. However, we do not say this explicitly … we added following sentences:

In spite of the potential of pristine forest-mire transitions to represent biogeochemical hotspots in the landscape, the CH_4 and N_2O flux levels in the transitions changed minimally during extremely large range of weather conditions. Our pristine forest-mire transitions did not act as biogeochemical hotspots for CH_4 and N_2O emissions. Therefore, when making attempts to up-scalee boreal landscape

carbon and nitrogen cycles, the organo-mineral soils of pristine forest-mire transitions should be regarded as CH_4 sinks and minor N_2O sources rather than having the peak emissions on the landscape level.

!Finally, there was a few incorrectly structured sentences, even if overall it reads well.

 # We reformulated the sentences.

!Page 2, Line 12,

The "lagg transitional zone" in the forest-mire ecotone receives nutrients from the adjacent mineral soil runoff, and is thus more minerotrophic, biologically diverse, and productive than open mires or bogs (Howie and Meerveld 2011).

!Page 6, Line 17,

The gas sampling was done within three days interval of the micrometeorological measurements.

!Page 16, Line 19

The occasional mineral soil CH_4 effluxes suggested that plants' deepest roots transport CH_4 via the transpiration stream (Megonigal and Guenther 2008).

Please implement these above mentioned suggestions and upload the final document,

Best Regards,

Donatella Zona

 # We implemented the suggestions, and in addition we clarified sentences on page13, lines 26-29; page 15,lines 25-27; page 16, lines 10-14;page 18, lines 2-7; page 18 lines 23- page 19 line 2.

We also express our gratitude to Dr. Donatella Zona and anonymous reviewers in the acknowledgements.

We appreciate the useful comments of the editor Donatella Zona and three anonymous reviewers who improved the manuscript.

 # References

Finnish statistical yearbook of forestry 2013. Finnish Forest Research Institute, Metsäntutkimuslaitos, Finland, http://www.metla.fi/julkaisut/metsatilastollinenvsk/index-en.htm, 2014.

McClain, M.E., Boyer, E.W.,Dent, C.L.,Gergel, S.E., Grimm, N.B., Groffman, P.M., Hart, S.C., Harvey, J.W., Johnston, C.A., Mayorga, E., McDowell, W.H., and Pinay, G.: Biogeochemical hot spots and hot moments at the interface of terrestrial and aquatic ecosystems. Ecosystems 6, 301-312, doi:10.1007/s10021-003-0161-9, 2003.