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Interactive comment on "Environmental correlates of peatland carbon fluxes in a thawing landscape: do transitional thaw stages matter?" *by* A. Malhotra and N. T. Roulet

Anonymous Referee #1

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The manuscript shows that the spatial variation is an important control of C gas exchange processes during permafrost thaw. While this is not a novel idea as it has been shown for different microforms/vegetation communities of other type boreal peatlands, it is still important to prove that this also holds for permafrost, whose thawing is likely to have large consequences for climate in future. As authors say, this should be handled also when building process based models for these ecosystems. The methods and approach are valid to most part, but see the specific comments. The presentation is clear and concise throughout the MS.

Specific comments: pg450 l23: quite small plot to capture a vegetation community pg451 l5: how large were your samples? your chamber is rather small, so sample col-

lection may cause pressure. or did you use some sort of vents? pg451 l20: with such a small chamber, how did you manage with increasing temperature and condensation during light measurements? pg452 l12. how did you manage with the VGA modelling with only 4 points? pg452 l23. what was the need for this transformation? pg453 l13: why did you choose this approach as these relationships are seldom linear? or what are you aiming with this? does this procedure capture for example the seasonality in the NEE that is lacking in eq 1?

pg 457 l4: you do not discuss VGA, although it was significant in your model and many previous studies have indicated the importance of its components as well. such as change from shrubs to sedges (other aerenchymatoes species). I assume this is the case in your study as well. if you would include only VGA of those species, you might get even higher significance for VGA. in addition, seasonal development of VGA is likely a better indicator of seasonality than julian day.

pg457 l10-14: you might like to take a look at paper Laine et al. 2009. Ecological modelling 220 (2009) 2646–2655 pg457 l16 delete 'was' from, which was makes.. pg457 l25-26: sedge VGA an explanatory here? pg459 l11: it is still not clear to me how you use VGA in the modelling. do you use some average value per plot for all measurements or do you use the modeled VGA so that seasonality is included?

pg460 l20-23: why do you ignore the impact of graminoids here? Figure 5. rather than an increase in R2 along thaw gradient, I see two groups defined by existence of permafrost and maybe cover of vegetation. the linear fit just doesnt work. Fig 6. I am not sure if I am reading this figure correctly. is it so that VGA is included only for stages 6, 8 and 9? and for stage 6 the estimate is negative? what does the models of stages 2 and 3 include, as nothing gets any values?

Interactive comment on Biogeosciences Discuss., 12, 445, 2015.