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Interactive comment on "Effects of nitrogen fertilization on the understorey carbon balance over the growing season in a boreal Pine forest" *by* D. B. Metcalfe et al.

Anonymous Referee #2

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General comments

This paper describes the results of carbon flux measurements in the understorey vegetation in a nitrogen addition experiment in a boreal forest. Measurements have been made in three 15-ha plots: one control plot, one low-nitrogen addition plot, one high-nitrogen addition plot. In each plot measurements have been done at 17 locations, which act as pseudo-replicates, as also noticed by Referee 3. There might be good reasons for this experimental setup, but this is not explained. The paper is excellently written, but several aspects need further clarification or explanation to get more confidence in the results.

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In addition, I think the correlation analysis is not correctly done. Correlations seem to be done over all 3 measurement periods. That is not correct if you want to compare biotic vs. abiotic explaining variables; there is large variation in fluxes over the measurements periods while the biotic factors tree proximity, shrub stem density and organic layer thickness do not change over time. Then it is not surprising that the biotic variables explain only little of the variance in fluxes. So correlations need to be done for each measurement period or for fluxes averaged over all measurement periods, so that n = 3 x 17 = 51 locations.

The experimental setup needs more explanation: How was the nitrogen added? Why were replicated nitrogen addition treatments not feasible? Is there information which shows that the three 15-ha plots were similar at the start?

Ra, which is needed to discuss the carbon balance of understorey vegetation, as measured R includes heterotrophic R and tree belowground R, needs more explanation: How was Ra measured or calculated? Was it measured in another year?

There is hardly any discussion of the results themselves: what is your explanation for the observed N treatment effects? Why is GPP in July so low? What is the role of the mosses?

Specific comments

p.14099, l.16-18 Isn't it possible to test for spatial autocorrelation?

Table 1. Please include letters to indicate significant treatment differences.

Fig. 1. I think it is sufficient to mention the regression characteristics in the text, instead of this figure.

Fig. 2. Why not include the overall treatment effect in the graphs? Or note in the legend that the overall treatment effect was not significant for all three fluxes.

Interactive comment on Biogeosciences Discuss., 10, 14093, 2013.