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Comment

Interactive comment on “Three years of increased soil temperature and atmospheric N deposition have no effect on the N status and growth of a mature balsam fir forest” by L. D’Orangeville et al.

Anonymous Referee #2

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This paper tells a very interesting story of the lack of an effect of warming or N deposition on tree growth, foliar N, and to some extent, foliar N. It falls within the scope of Biogeosciences Discussions, and there are some good design elements including a realistic N deposition treatment. The analysis of the seasonal basal area increment in response to the treatments is also novel and compelling. However, the paper could benefit from some revisions.

p. 1315:

6-7: "The meta-analysis" should be "A meta-analysis"

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p. 1316:

5-6: "treatments increased even more the performance" should be "treatments further increased the performance"

7: "interaction effects" should be "interactive effects"

12: "Obviously" is rather informal for a scientific paper. Perhaps "Thus" would be better.

p. 1318:

5-12: Some clarification about the whole plots and plots would be helpful. For example, perhaps the 12m x 12 m plot could be referred to as the subplot.

11-12: Later on, the methods state that fertilization and warming treatments were applied onto individual trees. Were the fertilization treatments actually applied onto trees that were randomly sampled within each block and the warming treatments installed under trees that were randomly sampled without each whole plot? Some clarification would be helpful.

p. 1319:

5-8: Because 2009 data were excluded from the analysis, perhaps remove details on methods applied in 2009 to avoid confusion.

20-22: Rephrase for clarity

p. 1320:

9-11: Were the probes inserted vertically or horizontally?

22: "mineral soil" should be "mineral layers"

22: The fact that samples were air-dried for a week before extractions seems highly unusual. Soil inorganic nitrogen levels change rapidly if soils are not kept refrigerated in field moist conditions before extractions. Is there a reference that can justify air-drying before extractions? Perhaps this methodological issue may explain why the treatment effects on available N and extractable N were different.

p. 1321:

13: "weighted" should be "weighed"

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14: "ground at 250 μm " should be "ground to 250 μm -sized fragments"

p. 1322:

1: "FH-" could be "FH-horizon" for clarity.

p. 1325:

2: "dependant" should be "dependent"

5-6: rephrase for clarity

8-10: Which procedure in R was used to run the mixed-effects ANOVA?

16-17: There does not appear to be enough evidence to say that the heated plots had a higher soil water content because the p-value is greater than 0.1, the effect size is very small, and later on in the discussion (p. 1331, ll. 20-21), it was reported that there was no relationship between soil temperature and soil water content. Figure 2 also shows that the SWC for the controls vs. heated plots is overlapping. In fact, I suggest changing Figure 2 so that it only shows the differences between the average SWC in 2010 vs. 2011.

p. 1326:

1-2: Did extractable NH_4 decrease by 47 percent in the mineral horizon in 2011 relative to 2010 or relative to the FH-horizon?

5-6: Did available NH_4 decrease in 2011 relative to 2010?

9-10: Based on the p-value and Figure 3, here does not appear to be enough evidence to say that there was a warming x year interactive effect.

23-24: Rephrase for clarity.

p. 1328:

23-29: See above for comment on methodology of extractable N.

p. 1330:

13-14 state that increased NH_4 availability may have hastened BAI phenology, but on p. 1328, ll. 28-29 state that the increase in available NH_4 was very modest. Because foliar N did not respond to the treatments and the increase in NH_4 was modest, there does

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not appear to be enough evidence to support that differences in nitrogen availability accounted for the change in BAI phenology. The second factor seems to be more well-supported by the evidence.

p. 1331:

15-17: This statement directly contradicts the findings in Section 3.1

Overall, I agree with the conclusions that warming and N deposition do not always increase tree growth, and the authors could improve their paper by removing discussions about effects that have p-values > 0.05 and by addressing the methodological issues for extractable N.

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