

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.

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We would like to thank the referee for the constructive and thorough comments. Following is a detailed description of the changes to be made to the manuscript and answer to the points brought to our attention by the anonymous referee.

REFeree. 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

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air-drying before extractions? Perhaps this methodological issue may explain why the treatment effects on available N and extractable N were different.

AUTHORS. Ideally, soil samples taken for the determination of inorganic forms of N should be analyzed immediately for accurate results. Any delay will inevitably affect the results due to the rapid biological transformations. And delays were inevitable due to the remote location of the research site, which prevented us from processing the samples immediately. The best alternate standard procedure was to dry soils at room temperature as soon as possible. Precautions were taken to minimize the effect of sampling. Samples were kept on ice until back to the lab. Small amounts of soils were sampled. The small volume of soil combined with a constant air circulation ensured a rapid drying. Samples were then stored in air-tight plastic containers which prevents contamination and rehumidification of the sample which could lead to further N transformations. We agree that the best method would be to extract moist soils rapidly after sampling. However, this was not possible for some practical reasons.

According to Editors M.R. Carter and E.G. Gregorich (Soil Sampling and Methods of Analysis, Canadian Society of Soil Science, 2007), “Extracting moist soils immediately after sampling is the ideal situation; however, this may cause problems with respect to storage and in obtaining a representative subsample. The use of moist soils would be preferred on samples related to biological studies (Hayes and Swift 1989, Soil Science 40:341-347). For most test procedures and fertilizer recommendations, air-dried samples at low temperature (e.g. room temperature) in an NH₄-free environment are used.”

We will include a reference to Carter and Gregorich (2007) in the methods.

Although we cannot exclude that the inorganic N values obtained from air-dried samples may have been affected by drying, there is no evidence that it may have affected one treatment more than another. Therefore, we believe that our methodological approach is valid for the purpose of comparing inorganic N content between treatments.

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Finally, it is important to mention that soil nutrient availability was thoroughly examined with the ion exchange membranes which provided a robust and continuous monitoring of potential changes in nutrient availability.

REFEREE. 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.

AUTHORS. We will remove the discussion about non-significant effects ($p > 0.05$) and address the methodological issue for extractable N (see above). We believe that the reviewer's comments should greatly improve the quality of the manuscript.

Interactive comment on Biogeosciences Discuss., 10, 1313, 2013.