

Interactive comment on “Nitrogen balance of a boreal Scots pine forest” by J. F. J. Korhonen et al.

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1 General comments

The authors presents a very nice study of pools and fluxes of N in a boreal forest ecosystem. They have done a great job at measuring the main compartments and main fluxes and the study could stand as an example of future studies in other ecosystems.

The main shortcomings are as pointed out by the authors themselves a lack of measurements of N-fixation and N₂ loss. Also, it would have been nice to have some more information about the N pools in the root system.

In the abstract I miss a statement about the accumulation mainly taken place in the
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above ground woody biomass. However, it should be expected that some N is also accumulated in the roots?

In the Materials and Methods section, I miss a description/definition of the “mini-catchments”.

The tables and illustrations are generally very good, however, I miss a root compartment in Fig. 4.

I highly recommend publishing this paper after some minor revisions as indicated below.

Some language revision is needed (especially definite and indefinite articles are missing, see some examples under specific comments).

2 Specific comments

Here I also give suggestions for rewording in several cases.

p.11202, l.3: In what way has the increased N-deposition altered the functioning?

p.11202, l.8: I think it should read: “N was accumulating **in** the ecosystem ...”

p.11202, l.15: But N is still limiting?

p.11203, l.19: “take up” or “uptake” rather than just “take”

p.11203, l.24: The reduced plant-available-N is probably not **because** of fertilization. Maybe it should just read: “**and** forests in general benefit from N-fertilization.

p.11204, l.12: “... and **the** total N atmospheric deposition.”

p.11204, l.17: “... at **the** SMEAR II-station ...”

p.11204, l.20: “... it **was** regenerated ...”

- p.11205, l.10: "**The** total soil-N pool was determined ..."
- p.11205, l.21: "The extractable pools of soil ammonium ..."
- p.11205, l.17: "... using **a** layer specific ..."
- p.11205, l.23: "... collected with **a** Westman soil auger ..."
- p.11206, l.3: "Nitrogen pools **on** soil particle surfaces ..."
- p.11206, l.4: "... in **the** uppermost 0.3m depth ..."
- p.11206, l.7: "The **pools** of ... **were** calculated ..."
- p.11206, l.13: "... were collected **in** weekly to **fortnightly** intervals ..."
- p.11209, eq.2: The constants 889 and 301 are presumably the area of the two catchments, but this information is not given until the following paragraph. I suggest that you write C1 and C2 in the formula and explain what these constants are. But in Table 3 "C1" and "C2" denotes soil horizons!
- p.11210, l.10-11: One mentioning of "above the forest canopy" should be enough.
- p.11212, l.8: "... two manual chambers **were** located ..."
- p.12212, l.15: What were the dimensions and material of the manual chambers?
- p.12212, l.21: What does "robust" exactly mean? It is now much more common to use nonlinear regression for static chambers.
- p.12213, l.7: How was the NO flux calculated?
- p.12214, l. : "... is concentration of N **in** green needles ..."
- p.12215, l.1: Delete the second instance of "of N"
- p.12215, eq.8: More explanation needed. I assume it is just the sum of the 5 years?
- p.12215, l.16: "The change of **the** non-soluble soil N pool ..."

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- p. 12216, l.4: "... bound to **the** soil matrix ..."
- p.12216, l.10: What is the exact uncertainty of this number?
- P.12216, l.13: Please go through the whole manuscript and insert correct definite ("the") and indefinite articles ("a/an") where needed.
- p.11220, l.7: I suggest to add that the accumulated N is in the tree biomass.
- p.11221, l.18: I do not understand how the lifetime of wood could be that long?
- p.11222, l.16-17: "study site" mentioned twice - delete one.
- p.11222, l.17: I do not think you really mean "respectable" here; exchange with "corresponding".
- p.11222, l.25: Does this mean that only the woody biomass pool is increasing?
- p.11223, l.9: No "the" here - just "in line"
- p.11237, Fig.4: The legend should also explain that the Δ values are annual changes in pools.

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