

Dear Editor, Dear Reviewers,

we thank you for the constructive comments and the chance given to modify the manuscript. We have now modified the manuscript and added point-to-point replies to the reviewer comments below.

On behalf of all the co-authors,
Tea Thum

Replies to the reviewer 2 comments

Reviewer 1 had no further comments on the manuscript. The comments from the reviewer 2 are in magenta, the replies to the comments are in black and the excerpts from the manuscript text are in italic.

This is my second time reviewing this manuscript. Overall, it looks very good. I have just a few additional minor comments:

We thank the reviewer for going through the manuscript carefully and providing constructive comments.

Is there any uncertainty to report in the observations? Information should be added about how many replicates of each sample were taken and what is the variation across the means across replicate observations (e.g., standard deviation or 95% confidence interval).

We thank the reviewer for this comment. We have added in results concerning the number of samples and uncertainties the following text (L112-116):

“In the observations, up to 26 samples were taken for the foliage pool, and around 20 for other aboveground plant pools and soil pools (Goodale et al., 2015; Goodale, 2017). Fine and coarse roots were represented by up to 10 samples, with somewhat smaller sample sizes in deeper layers. The standard error for the stock estimates were around 5-10 %, with highest uncertainties for the fine roots. The ^{15}N observations were on the order of 10-20 %, again with the highest standard error for the fine roots.”

L57-58: It is not clear what is meant as “optimal N fertilization for forest management”. What is being optimized?

In the context of forest management, it is usually forest growth and timber production are optimized.

We have modified the original sentence into (L58-59):

“These experiments have been valuable in estimating optimal N forest growth as well as in increasing the understanding of the N cycle in these ecosystems (Högberg et al., 2017).”

L426-427: This sentence is confusing as written. It is not clear to me what is being said.

The sentence the reviewer is referring to is:

“Our results would therefore suggest a larger impact on carbon sequestration, but our results span over decadal timescale, that has not been captured by the observations.”

We apologize for the unclear formulation used. We tried to convey that because in our simulations 80 % of the tracer residing in plant compartments was located in wood, this would imply a larger carbon sequestration than the study by Lin et al, who estimated about

half of the tracer being placed in wood. The latter part of the sentence is referring to the fact that our simulation reached longer than what the current observations cover.

We have modified this sentence into (L431-433):

“Our model simulations suggested a larger fraction of the plant compartment's tracer residing in wood than that reported by Lin et al. (2024), implying a greater potential for carbon sequestration. In addition, our simulations cover a longer time span than is currently available from observations.”

Check the manuscript for minor grammatical and spelling issues. Some examples are:

L1: “the” is unnecessary before “terrestrial”.

L18. “constraints” not “constrains”?

L186: “strongly” not “stronly”

L205: “the” is not necessary before “observed”.

In addition to addressing these four places, we went through the rest of the manuscript and corrected the grammar.