

Authors response

Thank you for finding the errors in the manuscript and providing further good suggestions for changes! The paper has improved so much, thanks to all your comments!

Comments to Co-editor-in-chief Sara Vicca:

I have changed BC weathering as suggested, even though BC (or Al, Si, Ca et c) weathering is very commonly used in published papers. I have rephrased the rest of the places you suggested too. Thank you for the very useful suggestions! I have tried to improve the language.

Comments to Anonymous referee #1:

I have made the suggestions you wanted – thank you for finding my errors! I have not colour coded the sites but instead pointed out in the figure texts which sites are in northern Sweden and which are in southern.

“Line 284ff: Can this assumption (which I think is fine) have an effect on the results. For example, depending on the pre-conditions prior the drought the response might be different?” - If you mean the using of different drought years for different sites: Yes, because the simulated drought is much less severe at the sites if you simulate it at a time when the forest is newly planted, so avoiding this rather short period of young forest does have an effect. The difference in how large the climate change has become in the period 2070-2074 versus in 2090-2094 could also have some effect, but not as much. The sites are situated in different climate regions, with different average temperatures and different local weather, which means that there will be differences regardless of exact drought years, due to for example one site having some drier/warmer/cooler/wetter than average years prior to the drought while another site does not. But the effect of presence of mature trees or small trees on the soil moisture has a big effect and we wanted that important factor to be comparable across sites.

Larger trees use more water – this is clear in the model results, and the developers of the model based this on data, but I don't have the reference right now. I have also seen data on runoff increasing some 200 mm/year after clear cut compared to before clear cut, but I don't have that reference right now either.

“Line 353: I am a little bit confused by the numbers presented here. In Figure 5a, the y axis only goes until ~3%, but the presented values here are much higher. Maybe I am missing something here.” – I presume you mean figure 5b, the figure with the relative numbers. In figure 5b, the weathering release rate of BC are release rate of BC during a certain season relative to the yearly average release rate of BC at that site, so that the rate of weathering at summer is larger than 100% of yearly average rate of weathering release, while the winter rate is below 100%. In the text in rows 353, the percentage is percent of increase in weathering release of BC for a certain season and site, compared to the same season and site at the earlier time-period (not compared to yearly average), so it is not normalized to the same number. I changed the axis labels a bit to hopefully make it less confusing.

The effects on weathering from possible changes in CO₂ fertilization on trees: these effects would be complex and it is hard to say beforehand in what way they would go. Less water uptake would increase soil moisture, but less uptake of water would also mean less uptake of BC, with perhaps resulting higher concentrations in the soil water, which would lower weathering. Also, less fertilizing effect from CO₂ globally would mean less CO₂ removed from the atmosphere globally and this would have effects on CO₂-concentrations in the atmosphere globally and on climate change, but global feedbacks on climate change is far beyond the reach of the ForSAFE model and would need to be given as input data.