

Responses to community comments, CC1

Below, we address the different comments given by community comments #1. We provide our responses to the comments, describe the overall actions that we suggest as a response to the referees comments and finally in detail describe the text that we suggest to be removed or revised to a new, revised version of the manuscript.

The line numbers that we use in this document refer to the line numbers in the original pdf-file of the submitted manuscript as used by the referees.

CC1, general comments

Referee comment.

“Interesting study, I am not an expert on this specific field, but I would suggest to compare your estimates, on section 4.6, with GHGI data submitted by EU MS (plus, in your case, Norway, UK and Swiss), rather than referring to quite old estimates (even if certainly important), such as Pan et al or, quite generic, like Forest Europe 2020. As far as I see, your estimates are well aligned with EU GHGI data submitted to IPCC. Indeed, looking to the data reported by CRF table 4.A for EU (National Inventory Submission 2023), for the period 2008-2012, the average C stock change in living biomass, in including UK, is around -362 Mt CO₂ yr⁻¹. This value is fully consistent with your data (I haven't check for Switzerland and Norway, but this should not move too far the average for the same period). On the opposite, Pan et al and Forest Europe report quite different estimates (560 and 570 Mt CO₂), also referred to different periods, compared with your study. So. I would not consider them”.

Authors responses.

We thank for this positive overall judgement. And thank for making the comparison with the CRF table 4.A for the EU. Good that there is a reasonable agreement. CRF table 4.A have a complicated structure with one sheet for each year, and it would be quite laborious to compile all these data for all European countries. This is outside the scope of this study.

Action taken

No action.

Referee comment.

On the same section, you also mention the EU target for LULUCF, equal to -310 Mt CO₂ yr⁻¹. However, by comparing this value with your estimates referring to the period 2008-2012, you should even mention that the current sink reported by EU, is quite far from the value reported for 2008-2012, and even more far from the EU LULUCF target (as already highlighted by Korosuo et al., 2023). Indeed, looking again to the data submitted by EU in 2023, for the living biomass pool, the latest biomass sink reported (i.e. 2021) is around -230

Mt CO₂ yr⁻¹. So, the potential contribution of ozone to the biomass C uptake is certainly relevant but the current situation is quite different from 2008-2012.

Authors responses.

Again, thank for your analysis. As the referee quotes, the current sink reported by EU is far from the EU LULUCF target. We already mention this in the discussion, starting line 606 “The yearly C sequestration to the European forests is expected to be short of the so called “forest reference levels”, i.e. the forest C sequestration levels agreed by the EU member states during 2021–2025 (Hyyrynen et al., 2023; Korosuo et al., 2023).” We do not think that we need to further stress that the current situation for EU is quite different from 2008-2012. We need to keep in mind that we in our study estimate only changes in living biomass carbon stocks, which is only a part to the total LULUCF.

Action taken

No action.

Referee comment.

Finally, I would suggest reporting all values referred to the biomass sink with negative sign, (i.e. -310 Mt CO₂ yr⁻¹, etc.), from an atmosphere perspective, in line with conventional approach used by IPCC.

Action taken

This is a good point, we will make this change throughout the article.