

Reviewer 2

General comments

The paper by Jiang et al. exposes the results of a new model aiming at better taking into account the decomposition of harvest residues when calculating CO₂ sequestration after planting new larch trees in clear-felled sites. It highlights that the CO₂ sequestration is often overestimated, as the decomposition of the residues can generate a lot of carbon dioxide which is usually unaccounted for. Overall, it is very unlikely that managed forests act as carbon sinks in the long run.

Comment: While the work is of interest, the article is rather difficult to follow and, in my opinion, lacks clarity. Please find below some specific comments.

Specific comments

Comment: L24–28: given the huge importance it will have throughout your paper, I suggest you define C sequestration and C storage here, so the difference between both is clear.

Response: They can be defined already here, i.e., in the first paragraph of the introduction.

Comment: L35–37: these two sentences are unclear.

Response: We can clarify them.

Comment: L38: circular definition; you define carbon sequestration by the carbon balance, which you define with the carbon sequestration.

Response: This sentence can also be clarified.

Comment: L41: yes, a carbon sink is negative – if it is positive, then it is a source and not a sink. I would thus remove ‘negative’.

Response: Agreed, ‘negative’ can be removed.

Comment: L69: please define NPV.

Response: You are right; NPV should be explained at first mention.

Comment: L74: how do they define ‘optimal harvest age’ in the paper you cite? Which criterion does optimal refer to?

Response: Whatever the objective variable (for instance, NPV or timber production), initial carbon stocks do not affect optimization results because the bias is the same in all management schedules evaluated during the optimization process. We can explain this more clearly in the revised version.

Comment: L100–103: please check these sentences, I may be wrong but it seems redundant to me. If there is a nuance, please make it clearer.

Response: Yes, one sentence is repetitive and can be deleted.

Comment: L115: the question may be naive, I am not an expert of wood consumption: if your model were to be used at international level, do you think it would be important to use country-specific values for these half-lives? Do consumption patterns significantly vary from one country to another, which would make the results country-dependent? Also, are all these values (half-lives and Table 1) dependent on the tree species?

Response: The question is about future consumption patterns. Because future wood products and consumption patterns may change, we think that the best way is to use internationally recommended or “usual” half-lives. In addition, there may be no information on regional and species-specific half-lives.

Comment: L130: please indicate once that RMB is ‘yuans’ (in the Table caption at least).

Response: Agreed that RMB should be explained in the Table caption.

Comment: L140: to me, the figure 1 is unclear: are all the points results from simulation with the same parameters? Or from different scenarios? Instead of huge ellipses, perhaps you could indicate the thinning times with a line or arrow, it would be more precise.

Response: The current explanation is as follows: “Five sample plots representing different site fertility categories were used to produce simulated data for modelling. The site indices of the plots ranged from 18.1 to 25.6 m (dominant height at 40 years), and the stand age ranged from 12 to 27 years. Alternative management schedules were simulated for each plot by varying the rotation length, thinning years, and thinning intensity.” It is a good idea to show the development of the biomass stock in one simulation with a continuous line. However, adding the lines to all simulated time series would make the figure too messy. Adding an example line would be possible.

Comment: L146–147: I don’t understand how you ‘predict the effect of thinning’ from this.

Response: It is assumed that a low basal area is a sign of recent thinning. If we model the effect of basal area (which depends on thinning), the effect of thinning is indirectly incorporated in the model. The same approach has been used in earlier research.

Comment: L149: is this the equation that governs the results in figure 1? If so, it should be presented before the figure.

Response: This equation does not govern the results of Figure 1, but Equation 2 affects the development of the biomass stocks since it is used to initialize the stocks. It makes sense to present Equation 2 before Figure 1. However, the current order can also be justified because Figure 1 is used to explain the way of producing data for Equation 2.

Comment: L201: why does foliage have a negative age in Table 2? I understand it may come from the best fit for the model, but shouldn't this ($T > 0$) be one of the constraints?

Response: The table caption explains that the table shows the "Parameters of the initialization models (Eq. (2))". This means that the values of parameters a_0 , a_1 , a_2 , a_3 , a_4 of Equation 2 are shown. The values for line T show the effect of untransformed age on biomass stocks. We suggest adding a new (second) column to Tables 2 and 3, called "Parameter", with entries a_0 , a_1 , a_2 , a_3 , and a_4 (parameters of Equation 2) to reduce the possibility of confusion.

Comment: L244: you should indicate the thinnings clearly on the graphs. Also, what % does a thinning correspond to (regarding the wood density)?

Response: Thinnings are in years where there are instantaneous vertical changes in the carbon stocks (Figure 4 a and b), which we can explain more clearly. The thinning intensity can be seen from the magnitude of the change in the biomass of living trees. The purpose of Figure 4 was to visualize the effect of initializing the DOM and HWP pools on the simulated development of the carbon pools. Therefore, we think that no more information about thinning is required here. However, we can add the thinning years and thinning percentages to Table 4.

Technical corrections

Comment: L166: maybe a typo, but there is no r in the formula.

Response: Yes, r is missing from Equations 3 and 4 due to a technical problem in converting a Word file to a PDF file.