

Clim. Past Discuss., referee comment RC1 https://doi.org/10.5194/cp-2021-65-RC1, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on cp-2021-65

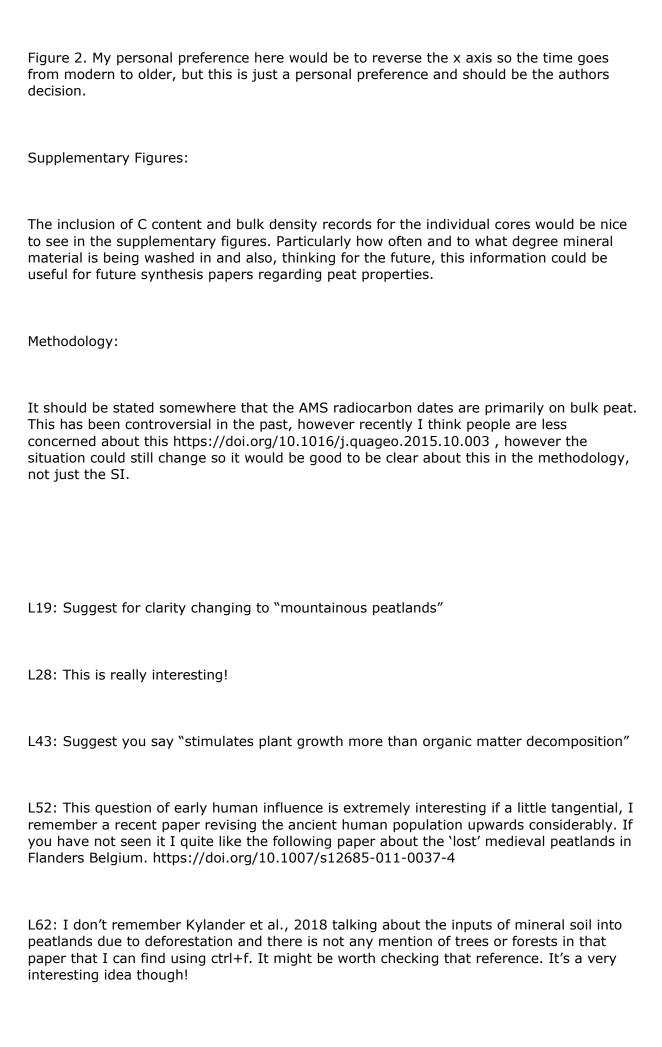
Joshua Ratcliffe (Referee)

Referee comment on "Carbon accumulation rates of Holocene peatlands in central–eastern Europe document the driving role of human impact over the past 4000 years" by Jack Longman et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-65-RC1, 2021

In this manuscript Longman et al., present eight new carbon accumulation records for peatlands in the Carpathian mountains and combine this with the one existing published record. Not only is this a highly novel paper due to the location and type of peatland analysed it is also an excellent contribution to the question of the drivers of long-term carbon accumulation in peatlands. Longman et al., have done an admirable job of untangling the complex drivers of peatland carbon accumulation both in their own data and in the earlier literature. The difference in dominant drivers between the early and midto-late Holocene is highly convincing and matches similar trends seen elsewhere for which others have thus far failed to find such a satisfactory explanation.

I find the main message of this paper quite convincing, that message being that long term peatland C can be controlled by either climate or nutrient factors and that indeed a combination of these two drivers are important. Although I am myself convinced of the direct role dust and nutrients can have on CAR, if I am to be the 'devils advocate' the authors may wish to consider and rule out the linkage between dust and/or mineral input and climate itself which presents a conundrum as to which is the direct or dominant driver of CAR. Dust inputs into peatlands have in themselves been used to reconstruct climate, with the expectation that increasing aridity results in more dust (e.g. https://doi.org/10.1016/j.epsl.2009.03.013). This raises the question about how independent dust inputs and climate really are. In the case of my own work in New Zealand it was quite easy to discount climate warming or aridity as we would not expect this after a volcanic eruption, but for this work the separation is less clear. This dataset might offer a simple opportunity to test this given the detailed climate and dust records the authors present. It might warrant inclusion of a new regression or correlation table in the supplementary material or at the least a sentence or two considering how dust and climate may be interlinked and how the authors can separate these as dominant drivers.

In addition to this point above I have some minor comments and suggestions, see below.



L72: Might be worth mentioning here how important these mires may be regionally for Romania/Serbia's carbon inventory, especially as so little carbon work has been done on them

L194: Also maybe worth mentioning that these numbers are more comparable to those from Eddy Covariance. It's also really cool that we have these high numbers now for downcore and gas measurements of C accumulation

L194: You might also want to consider this paper https://doi.org/10.1016/j.quascirev.2019.03.022 where there was also comparably high C accumulation despite a relatively harsh climate.

L195: The nutrients are presumably coming in in 'pulses' which seems to be quite important according to a new pre-print https://doi.org/10.31223/X5FW3J

L269: This could be a good place to mention the geology and soil fertility in the Carpathians. Is it exceptional in any way?

L271: Please define the migration period, I am not familiar with this

L293:297: Nice summary!

L308: This also contradicts the following highly cited paper: https://doi.org/10.1038/s41558-018-0271-1 however I can really believe this is the case given the bias towards regions with cold and continental climate

L346: I agree it is not possible to read too much into the recent changes for the reasons you have mentioned. I also recommend you remove the last sentence of the conclusion for this reason (L408)