

Interactive comment on “Wildfire history of the boreal forest of southwestern Yakutia (Siberia) over the last two millennia documented by a lake-sedimentary charcoal record” by Ramesh Glückler et al.

Angelica Feurdean (Referee)

angelica.feurdean@gmail.com

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The manuscript by Glückler et al., is timely executed study of past wildfire dynamics and associated drivers in Eastern Siberia. The manuscript is based on high quality data and statistical analysis, is clearly written and well referenced. The study concluded that, at this temporal scale, it is climate and human impact, rather than vegetation driving the past millennial to centennial changes in wildfire activity.

One of my main concern is the approach to the vegetation. The study is conducted

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in Larix (larch) dominated forests of Siberia. Larix is notoriously underestimated in the pollen records, and this should make it difficult to accurately reconstruct its past dynamics. Plant macrofossil analysis, mostly abundant needles (deciduous conifer tree), could help constrain its past dynamics, however, this is appropriately done in small basins or cores close to the lake margin, which is not the case of this site. The pollen record presented in this study neither show that Larix was an abundant taxon nor that its proportion have changed in the past, which likely highlights the problems above. I suggest adding a few lines acknowledging the problem of reconstructed past Larix dynamics based on pollen.

The other concerns on the chronology and charcoal peak analysis have been highlighted by the other reviewer (P. Higuera).

Specific comments:

I. 63-63 Barhoumi et al.2019 study lies in European Russia not in Siberia, please correct

I.100 Note here that Larix gmelinii as one of the main tree taxa

I.177 What do you mean by this? You broke the charr particles with a needle?

Palynological analysis I. 191-194, Ok, but it would be useful to also state the resolution of pollen samples I. 200 Which subsequent analysis? How were the % calculated?

I. 240 Please state what exactly was desired with the correlation between charcoal and pollen (not vegetation), and which pollen types were chosen and why. I got the feeling that the results from pollen record are minimized.

L.320 What was the propose on running CHAR on separate grain size and morpho-types? This is not stated in the methods.

I.325 Is there a difference between angular S and B morphotypes?

I.334 Do you mean similar pattern for all charcoal morphotypes?

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3.3 Vegetation history. I suggest adding the pollen diagram into the main paper. Would it make sense / increase visibility, to use continuous lines i.e, curves instead of bars to show trends in the pollen record? The past trends in vegetation are described in just two lines 353-355, an expansion of this is needed. In the pollen diagram (A1) there are two zones and at minimum the composition /differences between the 2 should be highlighted.

I. 347-355 I am confused by this statement, why is now Larix listed last? Additionally, the tree pollen composition may reflect that of the surrounding forest, but not the proportion. For ex Larix is one of the dominant taxa in the forest presently (according to the introduction and study area), however it was only found with scarred pollen grains.

I. 393 Barhoumi et al.2019 not in west Siberia

I. 405 Agree but this needs to be stated earlier in the methods and results.

I. 414 A few hundred meters is really little.

I. 419 How then?

I. 425. I am a bit confused here. To which letter /type do the elongated type belong? I believe that burning graminoids would produce elongated charr particles also in Siberia, judging from other studies on the L:W ratio. However, there are others fuel types that have elongated morphologies.

4.2.1 Vegetation I. 435. Apart of the problem of large site and footprint on pollen record, please think whether biases with Larix pollen could have also 'falsely' contributed to this monotony. Are there other pollen diagrams in the region to document how vegetation composition varied regionally?

I. 448 increased proportion of . . .

I. 450 do you imply that pollen is more problematic than charcoal?

I.478 which? Please state the age range?

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I. 480 you may want to look at the moisture record
<https://doi.org/10.1016/j.quascirev.2019.105948>

I. 550 given the large lake size, could charcoal input over time have been affected by different locations of fire in the catchment and the subsequent charcoal delivery into the lake?

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