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Biogeosciences Discussions

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.

Anonymous Referee #3

Received and published: 21 December 2020

This is a carefully prepared and well written manuscript. The topic is certainly important: fire records are needed from Siberia. Despite the detailed analyses, this is nevertheless a difficult site to interpret. I am not convinced by the results or their current interpretation for the following main reasons, which have been articulated in detail by the other reviewers.

1) The chronology is very difficult. The offset of 1000 yr in the bulk sediment series may be approximately right, given there is carbonate bedrock in the vicinity. However, the mixed-up macrofossil dates suggest that material of different ages becomes incor-

porated into the sediment matrix, so why not the charcoal?

2) The FRI's seem extraordinarily short. An average of 43, in a ∼2000 yr series that has a quiescent period of ∼600 yr is high, and when broken down into zones/phases, estimated FRI levels of 14 yr do not sound at all realistic. Nothing as short as this is reported from the region.

3) The relevance of calculating FRI's for different types of charcoal morphology is not explained and no convincing implications of doing this, or the results, are presented.

Thus despite excellent detailed methodology, it would be difficult to draw much that is useful from this study. This study would be better presented as simpler types of time series and together with the pollen (as suggested by the other reviewers); it is far preferable to treat the data appropriately than to develop complex analyses that could well provide a misleading picture of events.

Other comments

L80 useful to mention any estimates of FRI here in description of region, seeing this is a fire study.

L187 need to clarify a bit more about the samples that had no char analysis; was it just the 11?

L206 well established

L250 Between lines 250 and 263 there is repetition, this part needs re-writing. In general, the discussion of the radiocarbon dates is long and over-complicated. It would help the reader to place a statement about how mixed the radiocarbon dates are right up front and state the whole problem much more directly.

L266 sentence beginning "(II) Macrofossil 14C ages. . .." Not quite sure what this means

L345 The relevance of the PCA is hard to see; more explanation in caption would help. Given the lack of impact of the morphology data (and Fig 4 only mentioned in results

once), this could be omitted.

L400. “In general, FRIs increase with latitude due to lower incoming solar radiation, shorter fire seasons, and lower flammability of moist biomass (Kharuk,2016; Kharuk et al., 2011), which likely contributes to a relatively short mean FRI at Lake Khamra. “ Explain further? This site has a short FRI therefore.....it is further south than other sites? The argument is not clear.

L 419 argument is a bit hard to follow in sentence beginning “However, the present “

L459 there is low peak frequency during much of what might be thought of as the MO and higher one toward the end of the LIA, so there is not a very good fit to climate – this is over-interpreted, especially given the caveats provided and the difficult chronology

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