Dear Prof. Risebrobakken,

On behalf of my co-authors, I am happy to resubmit our revised manuscript "*Hydroclimatic anomalies detected by a sub-decadal diatom oxygen isotope record of the last 220 years from Lake Khamra, Siberia*" for its publication as a research article in the Journal 'Climate of the Past'.

We thank the reviewers for a second revision of our manuscript. According to the minor revisions asked from the first reviewer we slightly rephrased corresponding sentences to provide more clarity of the charcoal record, which is used as comparable proxy record. Please find our detailed comment response below. All technical corrections, suggested from the second reviewer, Anson Mackay, were considered and have been implemented in the text. Please do not hesitate to contact me if anything remains unclear.

We thank you for editing this manuscript and the fast processing time, which is very important and helpful for me as a PhD candidate.

Best regards,

Amelie Stieg

Corresponding author

Second review of the manuscript submitted to Climate of the Past by Amelie Stieg and colleagues with the title:

Hydroclimatic anomalies detected by a sub-decadal diatom oxygen isotope record of the last 220 years from Lake Khamra, Siberia

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Report #1, submitted on 25 Jan 2024, Anonymous referee #1

I thank the authors for addressing the points raised in the original set of reviews. The manuscript is now much improved. I do have one further point for the authors to consider:

Section 5.5 refers to a peak in fire activity at c. 1800 CE and links to the Charcoal record shown in Figure 7. The peak at 1800 CE is very small - is the peak statistically significant/different relevant to fire activity from c. 1790-1900 CE? If not, then the text in Section 5.5 needs revising.

ANSWER: Thank you for your feedback and the request regarding the charcoal record. We agree that a maximum around 1800CE in the "robust CHAR" record is small as shown in Fig.7 of our manuscript, as already replied in the comments on Rev#2 within the first revision. The two maxima in the charcoal record are cited from the work of Glückler et al. (2021). Therein, they calculated a peak component of the "robust CHAR" record. In the comparable time period (phase 4 of the charcoal record) two clear maxima are mentioned: "*Similarly, the robust CHAR sum and its components show increases within phase 4 (Fig. 3d, e), with two maxima in the robust peak component around the early 1800s and 1950CE and a following decrease in CHAR (Fig. 3d–e).*" Further they state: "*All peak component values exceeding the threshold were subsequently identified as signal (representing fire episodes) and marked when they overlapped with periods of SNI>3, indicating a clear distinction from surrounding noise.*".

Please find the original figure of the publication of Glückler et al. (2021) below. The two peaks in the comparable time period are above average values and identifying fire episodes. For the precise methods and calculations, we refer to the work of Glückler et al. (2021). Unfortunately, the peak component record is not freely available. Therefore, we show the "robust CHAR" record where the two fire episodes are less pronounced, but visible. According to Glückler et al. (2021), both peaks are statistically significant.

We may not have expressed ourselves clearly enough here and have adjusted the corresponding passage in 5.5.:

"*A charcoal record from a parallel sediment core of Lake Khamra (Glückler et al., 2021) is used as a regional wildfire proxy for the past 2200 years (Fig. 7, shown from 1750CE as "robust CHAR", which accounts for accumulated uncertainties). Statistical analyses of this charcoal record reveal two maxima within the comparable time period interpreted as increased fire activity in the area: one around 1950CE, the other less pronounced in the early 1800s (Glückler et al., 2021). The increased fire activity corresponds very well with enriched $\delta^{18}O_{diatom}$ values observed in phases II and IV (Fig. 7).*"

And in 5.7:

"*Even though, z-scores of the $\delta^{18}O_{diatom}$ record are less pronounced as in phase II, we identify a similar temporal correspondence between a charcoal peak in the early 1800s (Glückler et al., 2021) and elevated $\delta^{18}O_{diatom}$ values in phase IV (Fig. 7).*"
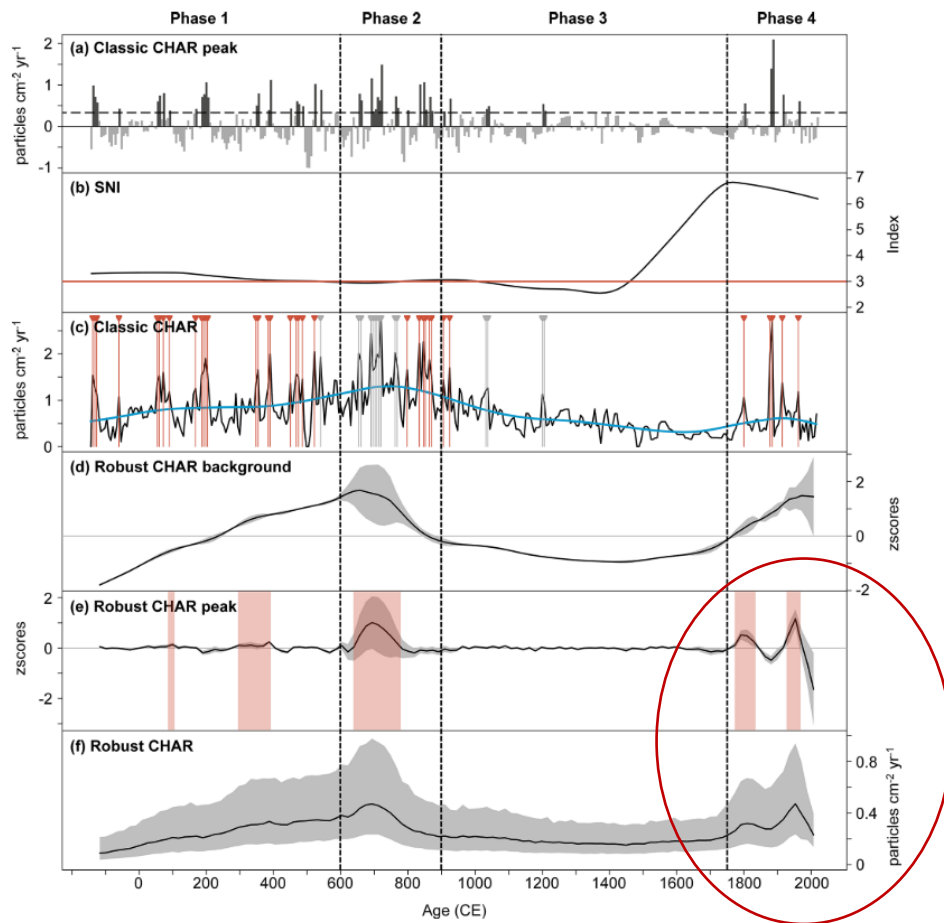
Figure 3. Overview of the charcoal record using classic and robust analysis approaches. Vertical dashed lines mark the different phases of the fire regime. **(a)** Classic CHAR peak component (dark-grey bars = signal, light-grey bars = noise, dashed horizontal line = threshold). **(b)** Signal-to-noise index (SNI) of the classic CHAR peak component based on Kelly et al. (2011) (red horizontal line = SNI cut-off value of 3). **(c)** Classic CHAR sum (black line = interpolated CHAR; blue line = LOESS representing the CHAR background component; red vertical lines = fire episodes with SNI > 3; grey vertical lines = fire episodes with SNI < 3). **(d)** Robust CHAR background component. **(e)** Robust CHAR peak component (red areas = above-average values). **(f)** Robust CHAR sum. For **(d)**–**(f)**, black line = median and grey area = interquartile range.

Glückler, R., Herzschuh, U., Kruse, S., Andreev, A., Vyse, S. A., Winkler, B., Biskaborn, B. K., Pestryakova, L., and Dietze, E.: Wildfire history of the boreal forest of south-western Yakutia (Siberia) over the last two millennia documented by a lake-sediment charcoal record, Biogeosciences, 18, 4185-4209, 10.5194/bg-18-4185-2021, 2021.