

The manuscript presents a methodological evaluation of pollen-based estimates of floristic diversity using two high-resolution lake records from the Swiss Plateau. The study addresses an important and well-known issue in palaeoecology, namely the biases affecting palynological richness, and tests several approaches to reduce them. The topic is relevant and the dataset is of high quality, providing valuable insights into both methodological challenges and long-term biodiversity changes related to land-use intensification.

Overall, the manuscript is well structured and clearly written. Although it is relatively long, this is justified for a methodological study, where it is important to describe all aspects in sufficient detail to allow other researchers to reproduce the analyses and understand the results. Additionally, a considerable amount of relevant and interesting material is provided in the appendices.

➤ Many thanks for the overall positive assessment of the manuscript!

However, a major concern is the inconsistent use of terminology throughout the manuscript, particularly with respect to terms such as “pollen richness”, “palynological richness”, “palynological diversity”, “plant richness”, “plant diversity”, “floristic richness”, “floristic diversity”, and “vegetation richness”, which are not clearly defined and appear to be used interchangeably.

➤ Thank you for pointing out this inconsistent use of terminology. We agree that this leads to confusion. In the revised manuscript we will more clearly define the used terminology, as well as use less different terms, keeping only ‘palynological richness’ as a metric of ‘palynological diversity’ and ‘floristic richness’ as a metric of ‘floristic diversity’ ; replacing the rest of the mentioned terms.

The specific remarks for the study are below.

Introduction

The introduction clearly and thoroughly presents the biases and problems associated with the diversity of pollen types.

Line 55.depends greatly **on** the amount of pollen produced ..

➤ Yes, we will correct this.

Methods

The methods section clearly explains how the different approaches (e.g., binning, constant-count and accumulation-based rarefaction, and separation of pollination types) were applied to assess palynological richness.

Line 163. ... the overrepresentation of **wind**-pollinated taxa ...

➤ Yes, we will correct this.

Results

The results are convincing in showing that standard approaches may lead to biased interpretations.

It would be helpful to add a sentence at the beginning of Section 3.2 that refers to Fig. C1, so that the appendices are cited in the correct order. Otherwise, Figs. C2 and C3 are referenced before C1. Given the large number of figures in the appendices, this adjustment would improve readability and make the paper easier to follow.

- Yes, we agree that citing the figures in the correct order will improve readability. To keep the information flow more efficient, however, we think it might be better to change the order of the figures in the Appendix, so that C1 will become C3, C2->C1 and C3->C2, and in this way are cited in the correct order.

Line 264: "...increase of ~2 taxa in Hallwilersee since ~1800 AD." It is not entirely clear how this value was estimated, as the figure seems to indicate a larger change. Similar discrepancies may also be present in line 275 (~2 taxa), line 316 (15 taxa), and line 318 (3–4 taxa).

- Thank you for pointing out that the observations describing changes in the figures should be expressed more clearly, we will revise this and use more precise language to describe the changes. For example, the change we are meaning to describe in line 264 is more the general increase of ~2 taxa around 1820 from the period after this time until the end of the record compared to the part of the record before this time, and not the short-lived larger change. We propose to change this part to:

"In both lakes, the richness trends of the wind-pollinated taxa show very little change over time, except for an increase in Hallwilersee around the year 1820 from ~25 taxa in the oldest part of the record to ~27 taxa thereafter.

Similarly, we will use more precise language to describe the other changes.

Line 271-273. "A temporary decrease around ~1960 AD is most apparent at bin size 10 though hardly visible at bin size 15, which is likely a result of the lower temporal resolution at the latter bin size." It is unclear whether the statement about the temporary decrease around ~1960 AD refers to Fig. 3 or to the appendix figures (e.g. Fig. C2). This pattern is not clearly visible in Fig. 3, and the reference should be clarified to avoid confusion.

- The statement refers to Fig. 3. Thank you for pointing out that this is not clearly visible. We will use more precise language to describe this decrease to guide the reader to the specific pattern we are wanting to refer to:

“A temporary decrease in richness after ~1960 AD is most apparent at bin size 10, showing a decline in palynological richness from ~45 taxa to ~40 taxa in the period of 1960-1965 AD (Fig. 3, left). At binsize 15, this decrease is hardly visible, likely as a result of the lower temporal resolution.”

Lines 268–276: You describe results based on Fig. 3, which presents the Baldeggersee data using the oldest age of the samples in each bin. However, in the following section (lines 277-280) on Hallwilersee, you refer to Fig. C3, which is based on the youngest age of the samples. This inconsistency in age assignment may lead to confusion and should be clarified or made consistent throughout the text.

- Thank you for pointing out the inconsistency in age assignment leads to confusion. We mention in the Materials and Methods section that the youngest age is assigned to samples when assessing the timing of richness increase, while the oldest age is assigned for assessing the timing of richness decrease. We recognize that this may need to be clarified again in the results section to avoid confusion.

Line 317: The reference to Fig. 4 (left) appears to be incorrect and should likely refer to Fig. 4 (right).

- Yes, we will correct this.

Line 287-289. It is not clear from the figures where the increase in the influx of pollen from wind-pollinated taxa around ~1960 AD can be observed. Could the authors clarify this.

- Thank you for pointing out this missing reference. The increase in pollen accumulation rates from wind-pollinated taxa around ~1960 should be observed in figure D3 in the Appendix. However, currently, there is a problem with this figure so that the timing appears to be incorrect. Despite what the caption reads, the figure currently displays the data with age assignment of the youngest age, so that the increase in pollen accumulation rates appears to have been earlier. In the revised manuscript, we will correct this mistake, so that the figure displays the correct curve and add the missing reference.

Line 326. ... two methods is the trend after 1945 AD ... The timing of the richness increase described as occurring after ~1945 AD is not entirely clear from Fig. 4, where the trend may appear to begin earlier. Clarification would improve consistency between the text and the figure.

- Thank you for pointing out this inconsistency. Also here, it will be clarified that for the assessment of the timing of this increase, we made use of another figure than for the assessment of the timing of decrease. We will add here a reference to this figure with a brief explanation:

Line 326. "... two methods is the trend from ~1940 AD onwards (timing assessed from richness curve with assignment of the youngest age of all samples in the bin: Fig C2, bottom left), with a richness increase in the constant count method by almost 10 taxa, while the curve of the accumulation-based method shows no major change."

Line 468. The terms "Aphanion" and "Caucalidion" refer to phytosociological alliances of arable weed communities, but this may not be clear to all readers. A brief explanation when first introduced would improve clarity.

- Thank you for pointing this out, we will add a brief explanation after their first mention in the revised manuscript:

"... revealing many sporadically occurring pollen types from members of the Aphanion and Caucalidion plant communities during this time (Rösch, 2014; Rösch 2016). These plant communities represent phytosociological associations of weeds growing in cereal fields on base rich (Aphanion) or calcareous (Caucalidion) soils. Their prevalence indicates cultivation of cereals such as *Secale cereale* and *Avena sativa* on less fertile, poor and dry soils, for example on eroded hills, providing habitats for many characteristic weeds (Rösch, 2014)."

Figures

The time axes of the figures appear to vary, with some starting around 1875 and others around 1900. Harmonizing these starting points would improve comparability between figures and enhance overall clarity.

- Thank you for pointing this out, we will harmonize the time axes of all figures in the revised manuscript to improve comparability and clarity.

Fig. 2. The p-values reported in Figure 2 are presented with excessive numerical precision. Report p-values using a simplified format ($p < 0.001$ or rounded to 2–3 significant digits).

- Yes, we will adjust this.