

Interactive comment on “Patterns in recent and Holocene pollen influxes across Europe; the Pollen Monitoring Programme Database as a tool for vegetation reconstruction” by Vojtěch Abraham et al.

Anonymous Referee #2

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Note to editor: The line numbers in the manuscript appear to be sometimes inconsistent. I assume this is a fault with the submission process not the authors' fault. Apologies if any confusion arises from this.

General comments

An interesting manuscript with great potential to improve interpretations of fossil pollen records. It is clear that a lot of careful thought and work has gone into this study. While it has potential to be very useful, the structure and clarity of the work could be

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improved. I think in particular the structure could be refined to be more consistent throughout, and in the Introduction and Discussion sections, sub-headings introduced to clarify the development of the argument.

There seem to be various strands to this paper:

1. The correlations of PAR with parameters such as forest cover and temperature as calculated from the modern samples
2. The question of long distance transportation beyond the current extent of the parent plant taxa
3. The relationship between modern PAR and fossil PAR for selected taxa

I feel that if the first two are clearly and separately addressed, it would be easier for the authors to address the third point coherently. At the moment, the results broadly follow this structure, but the Introduction and Discussion do not, I suspect if they did, the paper would flow better.

Specific points by section

Introduction

I was a little surprised that so much of the introduction dealt with history. Although I think this would merit its own sub-section, I think it would be better to focus on scientific questions addressed in the manuscript. Why pollen traps are an appropriate analogue for fossil records should be introduced. It would be nice to see some mention of species ranges and their possible fluctuation over time, and whether present day species distributions can be considered to be in equilibrium with climate. Another factor that could be addressed in the introduction is pollen dispersal and deposition; how far does pollen usually travel? This would set up the argument for your chosen LDT threshold.

2 Methods

General comment: all botanical names including species epithets need to be written

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with their authorities the first time they are mentioned in the manuscript. Up to date authorities can be found here <http://www.worldfloraonline.org/>. Upon first use, a species must be written out in full even if its genus has been mentioned by name previously. This is to avoid confusion between genera that start with the same letter. So for instance, *Pinus sylvestris* L. could be shortened to *P. sylvestris*, but then *Pinus mugo* Turra needs to be written as such before it can be abbreviated to *P. mugo*

Figure 1: As there is so much overlap on the map between modern and fossil sites, I think separating this out into two side by side maps with one showing fossil and one modern samples would make it clearer, and would also make it easier to go back and check locations of fossil sites as I was trying to do so later in the manuscript.

On page 7, 2742 samples were mentioned as being in the database (Section 3.1) but on line 8 only 271 are mentioned- which number was in the analysis?

2.2 Data Collection

It would be interesting to see a plot of surface area of trap against PAR to test for a relationship there and potentially be able to correct if one exists.

2.3 Investigated taxa and Environmental parameter

Why was 200km chosen as the threshold for LDT?

2.4 Comparison

Page 12: Figure 5 is a bit tricky to interpret, however, once I had realised what it was supposed to be showing I saw its value. I particularly like the LDT cut-off, which will be potentially very useful in interpreting fossil records. I was surprised, however, that LDTs did not receive further attention in the discussion section as it seems that they are a tangible, useful output from the work.

3.2 Recent and fossil PAR

Figures 6 onwards: In caption, specify that distribution of taxon is in grey. These taxon-

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specific figures are in general, I think, quite useful. I hope they are reproduced a little bigger (at least $\frac{1}{2}$ a page each) so that the details on the maps are easily readable. If this is not possible, maps should perhaps be split into separate figures to improve legibility. I am not sure the multi-coloured coding for the PAR values adds much to the figure- you could probably do away with (b) and still retain the meaning of the figures. I am also not clear on why, in the fossil graphs, only certain colours are included- why is only the highest PAR of interest?

3.4 Taxa specific results

How were the 'main taxa' to be presented chosen for this section? It seems odd that some are arbitrarily in the SM, particularly arboreal pollen which was presented in Figure 2.

Figures need to be referred to consistently in this section.

3.4.2 Betula

Why are traps from the Caucasus and Turkey ignored?

4.1 Discussion

The first sentence of the discussion doesn't seem to tally with the results- it looks, from your data, like the relationship between modern and fossil PAR is actually quite complex and variable. I don't necessarily think this is a bad thing, however; the paper presents a quantitative dataset that could potentially be used to help researchers quantify what their PARs from fossil data actually mean.

Line 22 onward: This paragraph seems to be about LDT, but that isn't explicitly stated.

Last paragraph of page 20 onwards appears to be, broadly, taxon-specific discussion of modern and fossil PARs; it would be better if this were clearly signposted and possibly split up with sub-headings.

I would be interested to see some consideration of how these results might be use-

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ful in feeding into quantitative reconstructions of vegetation. Although PDD models tend to deal in percentages, surely this approach (on cores with appropriate chronologies) could open the door to future models being calibrated using PARs, an interesting prospect for vegetation reconstructions, particularly given your LDT estimates.

4.2 Limitations

Line 21: Why are only 3 fossil sites listed here? Are the others not likely to show any bias?

Line 28: Unclear which analysis only included Poaceae and Cyperaceae

5 Conclusions

This is succinct and mostly well-structured but would benefit from a closing statement outlining the applications and take home message of the paper.

Technical comments

Page 2

Line 12: replace 'case' with 'cause'

Line 13: Could be rephrased as 'hopefully serves to improve interpretations' (or remove hopefully- I think it definitely will).

Page 3

Line 1: A good recent reference here would be Haselhorst 2020 (DOI: 10.1111/jvs.12897) showing high interannual variability in the tropics too- strengthens general argument.

Line 7: remove comma after 'Although'.

Page 7

Line 13: something strange happening here after 'values variation'- typo?

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Line 19: The sentences about fossil pollen seem out of place here as this section of the results is regarding modern pollen.

Page 14

Line 5: 'main text' – where in the manuscript is being referred to?

Page 20

Line 31 paragraph: I think this paragraph might be better placed at the end of this section. The phrasing in Line 32 seems a little odd as you go on to give an example of linking fossil to modern PARs- perhaps delete the 'details cannot be discussed' sentence.

3.4.8 Line ? (Line numbers unclear) correct LTD to LDT and remove 'threshold'

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-217>, 2020.

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