

Clim. Past Discuss., referee comment RC1
<https://doi.org/10.5194/cp-2021-36-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on cp-2021-36

Anonymous Referee #1

Referee comment on "Reconstructing burnt area during the Holocene: an Iberian case study" by Yicheng Shen et al., Clim. Past Discuss.,
<https://doi.org/10.5194/cp-2021-36-RC1>, 2021

This work attempts to validate a new method for past burnt area reconstructions using pollen and charcoal data. The methodology involves complex statistical and geospatial analyses, which are applied for the first time for this purpose. The geographic context is the Iberian Peninsula (IP). While I certainly appreciate the important aim of this work and the large effort in data gathering and manipulation here presented, I think there are some major issues that need to be addressed before this manuscript is accepted. I am providing details of some major (+ some minor) concerns here below.

Major issues:

- The calibration of area burnt using modern charcoal is not well explained. There is quite limited information about the modern charcoal samples, which seem to be core tops of unknown time coverage. This information is crucial to assess the validity of the approach. Also, at L99 it says that interpolation was used to extract present-day burnt area at each of the sites with modern charcoal records. However, the comparison of the locations of the modern charcoal samples with the GLM output suggests relatively low spatial coverage of the calibration (e.g. a large area burnt fraction was derived using the GLM in north-central Portugal, but there is only one modern charcoal sample in the region). Another figure showing the calibration of area burnt/modern charcoal needs to be presented, at the moment it is unclear how these two match.
- The area burnt fraction reconstruction shown in Figure 4 only 'matches' charcoal if we consider a long-term trend perspective. The individual wiggles are often anti-phase, which raise questions about the validity of the approach. Please reconsider the robustness of this validation.
- Using pollen data only to reconstruct area burnt can only work in limited conditions. The underlying assumption of the whole methodology is that vegetation (fuel) availability (derived by pollen assemblages) would vary through time only due to fire activity/spread. This assumption does not work in many regions on Earth and I am not quite sure it would work within some parts of the IP where there are other important controls and where fuel-limitation of fire activity is less dominant. The paper should

clarify this limitation and improve its discussion.

Minor issues:

- L30: the assertion that pollen records are more abundant than charcoal records is not valid for many regions on Earth. Maybe this generalisation is true for the Iberian Peninsula, but this has to be clarified.
- LL32-40: the first paragraph of the introduction reads like a series of loosely connected statements. The rationale for this work needs to be apparent in this paragraph, but at the moment it's quite confusing.
- L42: the Holocene is certainly a period when human agency was 'pervasive' in many regions. This is another generalisation that needs to be better expressed.
- L49: remove 'qualitative'
- LL54-57: this section does not consider climate into the equation, assuming that fires are fuel-limited. To make it work as a general statement, this should include susceptibility to burn. Alternatively, if this is only referring to the Iberian Peninsula, where fuel availability plays a more important role, this needs to be specified. This is still probably a generalisation, but it works better to introduce the study region.
- LL54-64: this whole paragraph is quite jumpy and confusing (starts with fuel availability, then it goes to pollen assemblages as a method to reconstruct past climates)
- LL72-74: This section makes your previous inference about the importance of fuel availability less valid and the whole approach more confusing. I think there needs to be a section introducing the drivers of fires in the IP.
- L79: this is a general reference to the EPD, but a list of record with references needs to be provided in supporting information
- L84: list with references needed for the charcoal records too
- L270: unclear links between paragraphs
- L272: this is of course true, but fire is not the only way to achieve land clearance and this approach assumes pollen assemblages are only varying in response to area burnt
- LL287-289: unclear sentence, confusing how the scarce availability of charcoal records would have led to large-scale patterns (these normally require lots of records)