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Climate of the Past Discussions

Interactive comment on "Relationships between low-temperature fires, climate and vegetation during the last 430 kyrs in northeastern Siberia reconstructed from monosaccharide anhydridesin Lake El'gygytgyn sediments" *by* Elisabeth Dietze et al.

Anonymous Referee #1

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Review comments on "Relationships between low-temperature fires, climate and vegetation during the last 430 kyrs in northeastern Siberia reconstructed from monosaccharide anhydrides in Lake El'gygytgyn sediments" by Dietze et al.

General comments

This paper explores the potential to use some sugars such as monosaccharide anhydrides (MA) levoglucosan, mannosan, and galactosan as indicators for low-

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temperature wildfire reconstruction at a very long-term scale. Also, the authors applied these proxies to reconstruct wildfire history in some cases over the past 430 ka in NE Siberia and tried to investigate the pattern of wildfire occurrences at the glacial-interglacial scale. The paper also gives some discussions about the relationship among fires, climate and vegetations. Overall, the usage of sugar materials for wildfire reconstruction and the wildfire history on some occasions for glacial-interglacial variations are very useful attempts. These data merit for publications.

However, I think some conclusions need more data to support and more discussions needed. For example, for the wildfire reconstruction using the sugar proxies there should be some discussions about the potential of the movement of these indicators in soluble condition since these indicators themselves are soluble. So, peoples would doubt whether these proxies have experienced movement after their deposition. If so, these proxies could not reflect the wildfires in the corresponding layers.

For the wildfire reconstruction from Lake El'gygytgyn sediments, the authors selected three glacial-interglacial cases. Due to the uncertainty of chronology reconstruction, the authors integrated the wildfire proxies into two periods, that is, glacial and interglacial. From my side, I think that such integration indeed could give some information for the glacial-interglacial variations of wildfire. But meanwhile it could mix some useful information and sometimes might result in some wrong conclusions. For example, previous studies also suggested that some wildfire occurs mainly during the transition of glacial-interglacial variations. Under such condition, the integration of wildfire into two parts, the glacial periods and the interglacial periods, would not give the real picture of wildfire pattern. In fact, the figure 3 did not give exact information on wildfire pattern at glacial-interglacial scale. There is no clear difference in wildfire between glacial and interglacial periods, except one case of MIS 11c and 12.

I really think that this study is a good attempt. I recommend it be published after some major revisions.

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Specific comments: 1. Lines 68-69. That's good to have an interpretation for fire intensity. But I would like to know the exact factor that controls fire intensity in this study, rather than the factors suggested here including three ones: fire temperatures, combustion efficiencies and fire radiative power. In fact, these factors have no clear relationship between each other. Is temperature more related to fire intensity? Or combustion efficiency is more related to fire intensity? In my view, I think that combustion efficiency is more related with the fire intensity, which has been improved by many previous studies.

2. Line 127, the authors selected three cases of the glacial-interglacial periods for wildfire reconstruction. I would like to know the reason for such selection. In fact, a continuous record of three glacial-interglacial intervals would give more robust evidences for the wildfire-climate relationship, I think. Please give some explanations.

3. Lines 139-140, please add a parentheses.

4. Line 154, "that cover the time period", which time period?

5. Lines 203-204, the subhead " 2.2 Analyses of source areas". I don't think that we could fully ignore the river input and only consider the atmospheric deposition for source analyses. So, the discussion about the source areas should include the local river inputs.

6. Lines 236-239, This could in general work on the condition that you have known that there were clear wildfire changes between glacial and interglacial periods. But, in fact, in your records of three glacial-interglacial periods, I merely find that the last one (MIS 11c-12) could present a clear increasing trend in MA from MIS12 to 11 (although it is not a full glacial-interglacial cycle), however, for the other two cases, there are no clear wildfire variation pattern at the glacial-interglacial intervals. So, I am not convinced of your conclusion that more low-temperature fires occurred during interglacial periods.

7. Lines 265-275, For those with $p > 0.05$, I don't think that there are relationships

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between these two proxies. So, in these cases you couldn't get some relationships for these proxies, especially when there are only very small numbers of samples.

8. These proxies for wildfire reconstruction used in this study are soluble sugar materials. So, people would like to know if there is possibility that MA would move downward and thus influence their indications for wildfire reconstruction? I think such discussions could not be missed in Section 4.1.

9. Lines 342-343, Please rethink about the sources and pathway of Mas since river input may be another source.

10. Lines 354-355, I am not sure about the explanation for MA to indicate a background wildfire. I would like to suggest this might be associated (mainly) with the local biofuel availability as well.

11. Lines 357-360, In fact, I do not find there is a clear relationship of low-temperature wildfire with maximum summer insolation. There is only one case in MIS 8, while for others more evidences suggest that this is not the case. I think that you should be more precise.

12. Line 396, a small error "is not adapted to is but able to survive fires"

13. Line 495. A error "CO2".

14. I am not expert to pollen. So, I also would like to know the meaning of the pollen and spores (such as drought or wet?). So, could you please add a brief explain the indications of the pollens and spores in Figure 3. This would facilitate people to know the climate condition.

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