Review for Journal: Biogeosciences (BG)
Title: Spatiotemporal patterns of tundra fires: Late-Quaternary records from Alaska
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No.: bg-2014-586 MS
Type: Research Article

General comments:

The authors are interested in tundra ecosystems and compare paleofire reconstructions from four different sites, including two in the North slope of Alaska. These four sites present different vegetation assemblages that encompass the full spectrum of sub-artic tundra ecosystems. Few studies have investigated these systems, despite their important role in the carbon stock. Additionally, this stock of carbon could be released in the future in response to climatic changes and increase of disturbances including fires.

Globally, the paper is highly interesting and the statistical approaches are appropriate and well defined. The data is robust and the interpretation is not speculative.

Outside of the global scale, I suggest some minor changes or additions (see below) to fully convince readers of BG.

Specific comments:

Abstract:

P. 3179 L.12/13: With the age uncertainties I am not confident to be that precise. I suggest you to give the time intervals or to round out numbers as “ca. 1650 to 6045” and “ca. 880 to 7030”.

l.15: actually your results prove a real differences in the means, then I will avoid “the results suggests” and add “the frequency of tundra burning was **significantly** higher..”

1 Introduction:

P.3181 L. 9: for those who are not familiar with boreal fires, I suggest to add “i.e. 100-300 years” at the end of that sentence.

2 Study sites

P.3181 L.26/27: Why do you choose the summer temperature and precipitation to compare with the fire regime? In boreal forests or in the Alps, that happens often to have winter fires. Even if you have more precipitation, the water is retained as snow and thus the conditions are drier than in summer. Although you choose 5km radius here, then you compare to 100km radius FRP. Can you justify your choice further here please in order to avoid issues about potential omission or misleading statements?

3 Material and methods

P.3185 L. 9/10: This choice of peak detection appears too restrictive to me. In that kind of ecosystem, as you explained, the background is very low. Then, identified a peak is easy and doesn’t need, according to me, to push the statistical tolerance that low. In addition, while you mentioned that detecting one more fire will completely change the history, I am confident that will not change the overall interpretation, even if you add the three fires you rejected (figure 3).

L.17/20: I didn't know about the FRP index and it appears really useful to compare paleodata and modern fire records. I just wonder, you assume here than the FRI of each lake represent a complete burn of the vegetation within the 100km radius around each site? If it is correct, then because you overlap two sites, can you still keep them as 2 separate results and analyze them accordingly?

L.26: I suggest pulling out "local", which doesn't appear to me an appropriate word to speak about 100km radius. Maybe is regional or sub-regional a better term?

L.28: The method to calculate the FRP is really clear and highly depends on the burnable vegetation within the 100 km radius of each site. Your modern record of fires started in 1950, and you used the vegetation survey of 2006. Have you checked if the vegetation cover was different between 1950 and 2006?

4 Results and discussion

P.3187 L.16: as in the abstract, that appears too precise taken into account the uncertainties coming from the age-depth model. I suggest "ca. 6450 cal BP" and "ca. 6480 cal BP" or the time interval. Also, why don't you express the date as "kcal BP" as in the rest of the manuscript?

P.3190 L15/18: see my comment about overlapped FRPs above.

P.1391 L.6/7: Do you have any suggestions regarding the exception of response of Tungak Lake? This is the largest lake, is there any possibility that this one has recorded regional burns as well?

L 21/23: I wonder why you present these data then? You should probably explain that but focus on the real difference you have with the means.

P.3192 L.25: I hope you already started a project!