

Interactive comment on “Fire in ice: two millennia of Northern Hemisphere fire history from the Greenland NEEM ice core” by P. Zennaro et al.

Anonymous Referee #1

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Zennaro and colleagues have analyzed multiple fire proxies for the past 2000 years using a Greenland ice core. They report the variability and compare this with what is in the literature and with climate data. This multi-proxy approach is an important step forward and the findings are very suitable for CP. It looks the manuscript was submitted under time pressure but it is still well written. My main comments are on the structure of the paper where I think the authors have to rethink it to avoid the discussion becoming overly long. For the rest I have no major concerns.

811-25 "Biomass burning emits up to 50% as much CO₂ as fossil fuel combustion (Bowman et al., 2009) thereby affecting the climate system". Fires emit CO₂ that has been sequestered and are thus not a net contributor to enhanced CO₂ levels as fossil fuel emissions are, consider rephrasing.

C74

812-8: "still not well defined but are in the range of $+0.03 \pm 0.12 \text{ W m}^{-2}$ (IPCC, 2007)". What does AR5 say?

812-14: "Precipitation affects fuel flammability, where conditions must be wet enough to allow biomass to grow, and dry enough to allow combustion (Pyne, 2001)." consider rephrasing

812-20: How do household fires affect global fire activity? By reducing coarse woody debris on the ground?

812-23: Century -> century

812-29: are have -> have

813-11: that occurs during -> is emitted from

In the introduction there is quite some space reserved for detailing issues with fire proxies other than levoglucosan. I understand those issues but it would be nicer if you mention them but at the same time explain what we have learned from them (instead of why they are not as good as levoglucosan) and what information is lacking that this paper can contribute

813-29: due to their short lifetimes and efficient removal processes -> isn't the short lifetime the result of efficient removal processes (as with BC) or are they also chemically broken down?

814-7: [high latitudes/hemisphere]?

Methods - I cannot comment on the methods used but the authors have an excellent reputation

2.3: I think it would be better to explain the statistical tools you used than to explain why you used them. Or do both

819-7: (CITE)?

C75

820-12: Supplement -> Supplement)

824-23: This is really a shining example of the strength of these ice core records over more local-scale measurements. This is new information we are eager for, please highlight these kind of findings more in the text and conclusions.

4.2: I think it is worth considering moving the description of the charcoal and CH₄ isotope analyses to the introduction to tell the reader what is known. Then 4.2 can be substantially shortened to show how the new data compares with what is known

825-21: This is redundant. As you see, I am trying to find ways to shorten the discussion. Right now it is 2/3 of the written text and I think the paper would be easier to read if you restructure it. More to the introduction (for the reader who wants to know what the current state of the science is) and less in the discussion (for the reader who wants to know how the current work agrees or disagrees with what is known)

827-16: North America and Siberian forests -> North American and Siberian forests

827: think this is the third time that atmospheric transport times are discussed, please introduce once and then refer to it if needed

I must say that the whole discussion is difficult to follow. There is so much text detailing recorded drought periods etc, and peaks are related to droughts, they are related to higher temperatures, etc. It might be better to highlight the main findings and leave out all the detailed information (year numbers etc) but refer to Table 2.

Interactive comment on Clim. Past Discuss., 10, 809, 2014.