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Climate of the Past Discussions

Interactive comment on "A Holocene black carbon ice-core record of biomass burning in the Amazon Basin from Illimani, Bolivia" *by* Dimitri Osmont et al.

Anonymous Referee #2

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The manuscript 'A Holocene black carbon ice-core record of biomass burning in the Amazon Basin from Illimani, Bolivia' provides a palaeo fire record from a region in desperate need of long-term records. The work offers an important contribution to our understanding of the relationship between palaeoclimate and the response of fire as important ecosystem driver. This manuscript is within the scope of 'Climate of the Past' and is well written and structured through the most part. With some minor changes to the writing style this manuscript can provide an important reference for palaeoclimatologists and palaeoecologists reconstructing the past of tropical South America.

The manuscript is mostly well written and structured, however, some sentences par-

ticularly in the Introduction and section 3.4 'Evidence of a Holocene Climatic Optimum dry period' could do with a closer examination. In the introduction the information is all there to set the scene, pose the questions and state the objectives but the interesting scope of this work is occasionally bogged down in redundant statements or overly long sentences. I would recommend a closer examination and edit of the introduction and section 3.4. by the authors.

Throughout the manuscript there is limited mention of non-biomass BC sources from major population centres within the Andes when covering the broken hockey-stick period, this needs to be expanded upon in the discussion if the concluding remark (P9/L32-33) is to stand.

Throughout the text vegetation burning in the Amazon Basin is identified as the source of rBC but little to no mention of more local burning of vegetation across the puna of the Altiplano or even the montane forests of the eastern Andean flank. Why is this not a reasonable source of at least part of the rBC signal?

The composite charcoal record for TSA (Fig 5e) records a noticeable drop around AD 1550-1600 corresponding to indigenous depopulation following European arrival. This decline is mirrored in the IL-99 rBC record (Fig 5a), is there a link? Also what is driving the increasing nitrate levels during this period as unlike the Industrial era increase its not linked to (NOx) traffic pollution and how is this linked to the decline in rBC? Also linked to this point, does the spike in the dust proxy (Ce) shortly following this ($\sim$AD 1640) relate to historical changes in human population and land-use? This would seem to be an interesting point of discussion but is only briefly mentioned on P6/L32.

P2/L13 – Sentence reads '. . . burning was almost absent from the Amazon Basin before the 1960's'. It's a very big claim to suggest that fire was almost absent in Amazonia prior to the 60's. This point needs clarifying. Do you mean natural fires? Or are you suggesting that from pre-European arrival all the way through to the rubber boom people didn't clear and burn forest within the Amazon Basin?

The last paragraph of the discussion (P9/L9-15) brings up a fascinating change in the IL-99 record around 6000 BCE, which is speculated to correspond to the 8.2 k event in Greenland. Perhaps this is something that will be focused on in future work, however, expanding on this potentially controversial point and mentioning its signal or lack of in corresponding South American archives would be useful.

P1/L9 – suggest changing 'partially' to 'particularly'

P1/L23 – Remove 'an' from sentence '. . .dry period caused an exceptional biomass burning. . .'

P2/L19 – consider adding sensu (in terms of) to the reference (Marlon et al. 2008) if this is the first publication to pose the 'broken fire hockey stick hypothesis' and you are discussing your work in terms of this initial hypothesis.

P4/L3-8 – This is a 6 line sentence. Consider splitting in two or numbering the previous types of studies.

P8/L5-9 – Clarify this sentence so that wet conditions specifically are related to Bakker et al (2001) use of benthic/planktic diatoms to infer changes in water level and Lake Titicaca's overflowing and that colder conditions are linked to glacier advance (Zech et al. 2007).

P8/L6 – remove 'Late Glacial'. Dates provided and mention of Coipasa humid phase are sufficient.

P8/L9 – Remove 'then'

P8/L13 – Remove paragraph break from here.

P8/L12 – Comma after however

P8/L19 – If several studies show this reference the publications.

P8/L21 –This is the first time pollen is mentioned as a proxy. Is this related to the

reference as last sentence?

P8/L29 – Remove WD abbreviation if it's the only time used in the text.

P8/L32 – Here, consider changing 'opposite' to 'antiphase'.

P8/L39 – change to '. . .responsible for drier conditions. . .'

P9/L6 – Change 'forest extension' to 'forest expansion'

P9/L7-8 – Why is this occurring? Can you offer a suggestion or link to another record?

P9/L12 – Add in 'the' and remove end of sentence to read '. . .revealing that its impacts were also apparent in the southern South American tropics.'

Misc:

AD should go before date and BC after date e.g. AD 1730 / 1000 BC. Regardless change AD/BC to CE/BCE as suggested in COP house standards.

Add a comma to all numbers 10,000 and above.

Check throughout the manuscript for correct capitalization of geographical locations e.g. should be western/west not Western/West when not referring to specific place names.

NH is only used twice as an abbreviation for northern hemisphere, while southern hemisphere is written fully throughout. Suggest just abandoning the abbreviation.

Figure 2 – Perhaps due to conversion to PDF the lines on Fig 2a and c maybe denoting the change to the y-axis appear to have shrunk. This change should be clarified.

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