

## ***Interactive comment on “Controls on fire activity over the Holocene” by S. Kloster et al.***

### **Anonymous Referee #2**

Received and published: 12 February 2015

This short paper follows one from Brücher et al. (2014) where the same authors studies how burned area and fire emissions have varied during the Holocene. The focus of this paper is to disentangle what drives the variations found in their earlier work focusing on the effect of fuel availability, moisture, and wind speed. Given that climate variations over the Holocene were substantial enough to impact fires this is an interesting research area and after a substantial revision this paper would be a welcome addition to the literature.

My main critique is that after reading the paper I still have many questions about the findings and implications. This is partly due to the paper being so short. Splitting and expanding the Conclusions section into a longer discussion and shorter conclusion section would be helpful. Things that require additional discussion include:

- how representative is the comparison between charcoal and models? In Australia for

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example the charcoal records are mostly in the SE while most fires burn in the N. For the comparison the authors could sample only those grid cells where charcoal records were derived from for example.

- Conceptually, it is difficult (at least for me) to understand how fuel availability and moisture can be seen separately. Aren't those tightly coupled? This is discussed in the Conclusions section but it would be better in the methods section.

- The modeled short-term variability is in general very low (gradual changes) while the charcoal record gives much more fluctuations. This requires discussion. Is it the smoothing? Are not all climatic changes represented in the model? Etc.

- What are the implications of this study? The abstract ends with a statement that the findings are important to project future climate but there is very little about this in the main text. Including this would increase the impact of the paper. Clearly this requires also a balanced discussion between the role of climate and the role of humans.

Minor comments:

P4260 L21: I assume it is 5 degrees instead of 51 degrees

P4261 L12: "Fuel availability is simulated as a function of aboveground biomass". Since in many savanna ecosystems trees don't burn (and higher tree densities often lead to lower grass fuel loads which do burn) biomass is not the same as fuel availability. Please change or discuss in more detail.

P4261 L15: "Human ignitions are not accounted for". I think this is fine for the purposes of this study given the limitations outlined by the author but it does limit the extrapolation to the future which should be discussed, see for example a recent paper by Andela et al (2014) in Nature CC showing that the human factor can already be seen in the satellite record in Africa.

P4263, L10: "This trend fits to with an increase", please rewrite. Also some minor wording issues, for example inline -> in line (several occasions), therefor -> therefore

Figure 2: These figures are too small to interpret easily. In addition a legend would be helpful for quick interpretation (right now the yellow line is not labelled, I assume this is the charcoal index, and in addition this color is difficult to see). It might be good to consider to make these separate figures

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Interactive comment on Clim. Past Discuss., 10, 4257, 2014.

**CPD**

10, C2371–C2373, 2015

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