**Biogeosciences
Discussions**

Interactive comment on "Modelling burned area in Africa" *by* V. Lehsten et al.

Anonymous Referee #3

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The authors present two models for parameterizing burned area in Africa in a manner suitable for dynamic vegetation and other global models. The subject matter is appropriate for *Biogeosciences* and will be of interest to readers. While I have no major issues with the modelling aspect of the paper (but see minor issues below), I believe there are potentially several significant problems regarding the manner in which the authors used the MODIS MCD45A1 burned area product. Details are provided below.

Page 4387, line 5 - Change "wildfires activities" to "wildfire activities".

Page 4387, line 21 - Change *scale* to *scales*.

Page 4390, line 21 - Change *once* to *one*.

Page 4390, line 16 - "All pixels classified as 1 'unsuitable' in the MODIS product were discarded." Please clarify how such pixels were identified in the MCD45A1 monthly product. Based on my experience using the product and consulting the *Collection 5 MODIS Burned Area Product User's Guide*, I can find no such classification. Are you determining this from the QA layer? If so, a value of 1 does not mean "unsuitable".

Page 4390, line 21 - "We calculated an annual 'burn ratio'... by calculating the ratio between the number of pixels classified as 'burned' over the 12-month period and the total number of valid pixels within the same grid cell." Please clarify what you mean by valid pixels.

Page 4390, line 24 - "We thereby assumed indirectly that the pixels that were not classified in the MODIS product experience the same fire frequency as the classified pixel." Surely this assumption must break down during the wet season. In west Africa the majority of 500-m pixels in MCD45A1 product are unclassified during the wet season due to persistent cloud cover. Based on your assumption this suggests that you will be incorrectly boosting the annual area burned in each grid cell by a factor of roughly $1 + 3/12 = 1.25$ (assuming a three month wet season). Please clarify.

Page 4393, line 19 - Which TRMM precipitation data set was this (e.g., 3B43)?

Page 4394, line 5 - Please define the index d (presumably day).

Page 4401, line 18 - Change "...below the spatial resolution of this analysis which is

performed on a one-degree spatial grid" to "...below the 1° spatial resolution of this analysis."

Page 4405, line 5 - "The found is uni-modal..." Unclear what is meant here and grammatically incorrect.

Page 4405, line 16 - Change "At a single cell, ..." to "Within a single cell, ...".

Pages 4405-4406 - The decreasing trend in area burned you found for Africa is very interesting. As the total precipitation did not change, you attribute this result to the GCM assuming the spatial distribution of something changing. Are you referring to the spatial distribution of precipitation? I'm curious as to how much responsibility the monotonically increasing population projections have for the decreasing burned area trend, if any. This is especially so for the northern hemisphere, where you show the population tripling by 2060.

Page 4406, line 9 - Change *consisted* to *consistent*.

Page 4406, line 20 - Re. the apparent shrinking of the climatic range susceptible to fires, it would probably be good to illustrate this over the continent with a map as in Figure 4 showing, e.g., the change in burned area from 1980 to 2060.

Page 4414, second line of Figure 1 caption - Delete *resulting*.

Page 4417, Figure 4 - Caption is incorrect (figure does not show standard deviation).