

## ***Interactive comment on “Effects of climate variability on Savannah fire regimes in West Africa” by E. T. N’Datchoh et al.***

### **Anonymous Referee #1**

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The paper entitled, “Effects of climate variability on Savannah fire regimes in West Africa” aims to draw connections between various global- and regional-scale climate phenomena and fire regimes in West Africa. A better understanding of how various climate anomalies can influence burning practices and fire regimes in a region where large areas are affected by fires would be useful information. The paper has several serious shortcomings, however, that limit its usefulness.

The first flaw is that the text requires a careful going over by an editor. It is apparent that the authors do not write in English as a first language and I found it very difficult to understand portions of the text. The second shortcoming concerns references. There is a wealth of publications on fire, burned area, and burning practices for the West African savanna region, yet the authors cite little of it. For example, there are numer-

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ous studies of burned area and fire frequency that could be referenced and a healthy literature on the burning practices of people living in West Africa (the authors cite a paper from Australia but should see work by Laris 2002, 2011, and Mbow et al 2000 for examples). At the very least if the authors are going to publish their data on frequency and area burned, they should reference the appropriate African studies in the discussion (See Barbosa et al 1999, Eva and Lambin 1998 for starters, but there have been many more recent ones). Thirdly, and most importantly, the authors do a very poor job of discussing the bias and error inherent in the burned area product they use in the study. This so called “low resolution” bias has been well documented in the literature (See Boschetti et al 2004 and Laris 2005). At the very least the authors should carefully explain the bias and note in the discussion how it may (or may not) influence their findings. Also, for the purposes of mapping fire in African savannas, 1km x 1km data should be considered “coarse” resolution given that fires burn fine-scale mosaic patterns in many environments. Fourthly, the explanation for how the regional climate factors influence fire regimes is confusing. This may be due in part to the poor English. Regional climate factors influence precipitation, not fire. Fires are set by people for a wide variety of purposes and the time and place they set fires (and how those fires spread) may be indirectly related to climate factors. This should be stated clearly. I think that the addition of a table that indicates the different fire “regions” (not sources which is a poor choice of words) studied listing the expected influences of climate on precipitation and how this, in turn, impacts vegetation growth and fire would be extremely informative. In its current organization I found it difficult to interpret the results. Finally, the authors make several point about how in some areas fire increases following a low rainfall year and in others fire increases after a high rainfall year. This should be carefully explained in the text (it is not) as it is a critical point. Also, the authors should reference studies indicating an important difference between rainfall determined and fire determined savannas in Africa (See Sankaran et al 2005) for an explanation. It is important to explain why fire patterns change as a function of precipitation in different types of savanna. It would also be useful to add some information on human liveli-

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hood and burning practices in these different regions as fire uses vary by region (See work by Mbow et al). It must not be forgotten that these patterns are ultimately shaped by human land use practices (in more arid savannas, the goal is to prevent all fire, in moister savannas, the goal is to time fire appropriately so as to take advantages of its impacts on vegetation such as regeneration of perennial grasses (see MBow et al ).

A few additional comments and observations:

I found this statement interesting, “This study revealed that, even though fire during the dry season was a purely anthropic activity, the variability of BA could be influenced by physical phenomena such as sea surface temperatures (SST) and sea level pressure (SLP) via their link to the climate.” Although the authors stress the variability in area burned they find in their data, the data also shows a striking pattern of regularity in terms of the timing or seasonality of the fires. The onset and peak fire points seem very consistent over the study period. This seems to warrant at least a comment in the discussion.

The authors explain the 2000-2001 anomaly in burned area but not the 2004-2005 one which is the most dramatic. Can it too be explained? Why not?

This sentence seems half true, “Even if fires are an essential anthropic activity in this region, the climate regulates the quantity of available dry combustible and its state (ground and combustible humidity, air temperature, wind speed, etc.) for fires to spread.” This is only half true because people regulate the timing of setting fires which can determine the humidity, wind speed, air temperature and conditions of the vegetation when a fire starts.

I am not prepared to site specific grammar errors as there are too many. However, there are some key phrases or words that are confusing and that should be addressed.

1. “Bush fires.” I would stay away from this term as it has little scientific meaning. If these are “savanna fires”, then use that term. “Biomass burning” is also a possibility,

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although it usually has a broader meaning. 2. Although I agree that the fires are “controlled” to some degree in West Africa, this does not seem appropriate language. Just state “fires were observed” is better. 3. I associate “sources” with smoke, not fire. I would call these “regions” or “areas”. 4. El Niño events do not necessarily lead to changes in fire “practices” they may result in changes in burned area. 5. The phrase “variability in the span of BA” makes no sense. What is a “span” of burned area? 6. I would use “human” rather than anthropic 7. I do not agree that the results “reveal an evolution” in Burned Area. Change, perhaps or variation over time. 8. “Vulnerability map” seems to be an odd term, as it is usually associated with accidental fire. African fires are often purposefully lit.

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