

## ***Interactive comment on “Causal relationships vs. emergent patterns in the global controls of fire frequency” by I. Bistinas et al.***

**Anonymous Referee #1**

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Review of 'Causal relationships vs. emergent patterns in the global controls of fire frequency' by Bistinas et al.

The authors tried to explain observed burned area patterns with a suite of parameters representing climate, vegetation, and humans. It is one in a series of papers (Krawchuk, Archibald, Moritz, Knorr, etc [all acknowledged in the paper]) with the same aim and none of the findings is really novel I would say. However, I feel the paper has added value because it more thoroughly examines some of the known relationships (e.g. burned area over an NPP gradient) and explains in detail how these are often the result of different processes captured by one variable. The distinction between causal relationships and emergent patterns is conceptually very interesting. In addition, the paper stresses the need for the DGVM-fire community to continue improving the models,

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an important message.

The paper is very well written although I would appreciate a summary. The graphics are weak and have to be improved substantially to better convey the messages.

Figure 1:

- density scatter plot instead of scatter plot
- axes labels have to be clarified, the values are meaningless to most
- make 3 x 4 plots instead of 6 x 2 so the graphs can be larger

Figure 2:

- I think you can add a few bins by using a different color scheme. Right now the bins are extremely wide
- One thing that draws attention is that the savannas are reasonably well captured, but mismatches are large in temperate regions (e.g., the US). This requires a bit more discussion than "The broad geographic and seasonal patterns are captured well by the GLM"

Figure 3: same first two comments as for figure 1.

One other comment is that parameters derived from a global study are not necessarily regionally applicable. For example, on a global scale lightning may not be important but in the boreal region most (large) fires are started by lightning. This should be much more clearly acknowledged

Some minor remarks:

3874 - 6: 0.5<sup>o</sup> -> superscript

3876 - 13: this is for the tropics at adds with the Hadley circulation which makes for fires burning in the winter. Since the patterns look okay in Figure 2 it may be just a typo?

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3877-15: 38 g C / m<sup>2</sup> / year is extremely low (desert), please look into this

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