

Interactive comment on “Quantifying the role of fire in the Earth system – Part 1: Improved global fire modeling in the Community Earth System Model (CESM1)” by F. Li et al.

Anonymous Referee #2

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The authors present improvements in the global fire parameterization of Li et al 2012 and use it within CLM4 to simulate the evolution of burned area and carbon emissions due to fire from 1850 to 2004. The paper is interesting and certainly within the scope of the journal. I have mainly minor comments but I would like the authors to better discuss their historical simulations and what are the drivers in the changes they see.

1. why did the historical simulation start in 1850 ? It seems a bit close to the peak in burned area that seemed to have happened in the 1870ies as discussed p 16779. As of now, it looks like this peak is simply an incomplete spin-up of the model. Linked to this, I don't quite understand what in the drivers of the model can explain this peak. If

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I understand well, it is not the climate (same 25 years cycled). From the description of the data, the only available data that covers that period is population density from the HYDE database. Is that right ? So, why a peak in 1870 ? This should be further discussed and the time frame of the databases better described (a table may be useful). I also don't understand what is the driver of the continuous decrease in the case without anthropogenic influence. This is very interesting and should be discussed in more detail (may be in another paper ?).

2.p 16772: The description of the numerical experiment is a bit vague. The authors say they followed a suggestion of the CESM user guide and used the “I20TRCN component set rather than component sets which use full coupled CESM1”. What are component sets ? Are they the modules of the CESM ? (land vs atmosphere vs ocean etc) ? The authors should simply state which model they used (CLM4 with carbon/nitrogen biogeochemistry if I am not mistaken). The authors say that I20TRCN is a “20th century simulation (1850-2004) So is I20TRCN a “component set” or a simulation ? I don't believe they should mention this I20TRCN at all. They also say that the atmospheric observations are obtained by cycling 25 yr (1948-1972). Do they mean that they cycled 1948-1972 to force the model from 1850 to 1947 ?

3.p 16775 last paragraph: “Mod-new and Mod-CTEM underestimate Fire season (summer)”. This sentence is awkward, rephrase

4. Just a comment about the underestimation in Africa. Beside socio-economic factors, there might also be cultural ones. In Gabon for instance, people burn grasslands every year mainly because they've always done it. I believe there might be some interesting sociological/anthropological study to be done here but that is obviously not the purpose of this paper.

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