Biogeosciences Discuss., 12, C7371–C7373, 2015
www.biogeosciences-discuss.net/12/C7371/2015/

Biogeosciences Discussions
Open Access

Interactive comment on "Climate, CO_2, and demographic impacts on global wildfire emissions" *by* W. Knorr et al.

Anonymous Referee #1

Received and published: 4 November 2015

Knorr et al present an analysis of changes in emissions from fire from 1901 to 2100 using various climate, CO2, and demography changes. The authors use a semi-empirical fire model coupled with the LPJ-GUESS biogeochemical model to evaluate and estimate the effects of each driver related to emissions change. They conclude that because of interactions between climate, CO2 and demography, that global fire emissions may remain stable over the 21st century, which is in contrast to previous work on this topic using purely statistical extrapolations. The way that the interactions are investigated is very useful and the manuscript provides some important hypotheses and insights into global change processes.

I suggest the title be changed to "Climate CO2 and human population impacts on global wildfire emissions". Demography can be either vegetation or human, and this wasn't

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

entirely clear given the model being used and that the abstract/introduction discusses 'woody thickening' also as a demographic process.

Please provide a more mechanistic description of why LPJ-GUESS woody encroachment results in reduced emissions under the CO2 scenario. Is it because of a decrease in fine fuels (i.e., grass), or is it because of the fire resistance of the woody PFT being greater than grasses? It is not clear in the manuscript which process in LPJ-GUESS actually causes the decrease in emissions associated with woody thickening.

From an LPJ-GUESS perspective, what exactly is 'woody thickening' ? Is it an increase in the number of individuals per cohort, i.e., stand density, or an increase in stand biomass, e.g., greater productivity?

Much is made of the Bistinas 2014 and Knorr 2014 paper on whether increases in ignitions cause increases in fire frequency. However, this seems at odds with how population density (a proxy for ignitions) is linearly related to burned area. Given that the demography plays such an important role in this paper, can you try clarify these statements in the context of how the model is developed.

Lightning is also an important cause of fire. Romps et al. (2015 Science) suggest lightning strikes in North America will increase by 50% this century. Some discussion of lightning ignitions, and lightning strike changes with climate seems warranted.

Minor comments

- P15015 Line 25: I think you mean < 3 mm (not > 3 mm) when describing the Nesterov Index

- Check EMS mix up with ESM throughout manuscript

- Can you describe how the patches are selected to be burned once the grid cell burned area is estimated

- The relationship between demography and burned area is optimized for present-day

BGD

12, C7371–C7373, 2015

observations. However, we know that the fire suppression and management policies change regularly. Additional discussion on the role of management, particularly on whether new policies that might allow large fires to burn, thus changing the burned area/demography relationship, would be useful.

- Change “Climate effects” -> climate affects

Interactive comment on Biogeosciences Discuss., 12, 15011, 2015.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper