Biogeosciences Discuss., 12, C7927–C7929, 2015
www.biogeosciences-discuss.net/12/C7927/2015/

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Prescribed-burning vs. wildfire: management implications for annual carbon emissions along a latitudinal gradient of *Calluna vulgaris*-dominated vegetation" *by* V. M. Santana et al.

Anonymous Referee #2

Received and published: 24 November 2015

General Comments: This manuscript presents simulation results on carbon emissions from different prescribed fire frequencies and different wildfire frequencies in moorlands. The manuscript does an insufficient job of explaining how wildfire was simulated and accounting for the effects of wildfire. The model does not include the impacts of fire on the peat in the system, nor does it explain whether or not this peat is combustible under typical prescribed and wildfire conditions. Furthermore, wildfire is a stochastic process and it was simulated in a deterministic manner. As much as the climatic conditions vary between sites, I would expect that the probability of wildfire varies. If wildfire

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

is treated stochastically and an ignition occurs in the year following a prescribed fire, first principles would dictate that the ignition would not result in much of a wildfire because of the limited biomass available to burn. Alternatively, if by removing vegetation cover, prescribed fire changes the biophysical environment and the peat dries out, an ignition following wildfire could have substantial C emissions.

There is one even bigger shortcoming of this manuscript. The authors did not simulate emissions from wildfire in the absence of prescribed burning. To effectively compare wildfire and prescribed fire emissions and make any sort of evaluation about the carbon implications, wildfire will need to be simulated in the absence of prescribed fire. It will also need to be simulated stochastically with regard to both occurrence and size.

Specific Comments:

P20 L10: Fire severity isn't the best metric to use in the context of how much biomass is combusted and it isn't clear why the authors state that it should be expected that wildfire will result in higher CC than prescribed fire. This is going to be highly system dependent and a function of the fire intensity as defined by Keeley (2009).

P20 L23: Krawchuk et al. (2009) does not include support for the statement about combustion completeness.

P22 H1 and P32 L4-6: The authors had site data about temperature, precipitation, and soils. Why then propose a hypothesis that suggests there will be a temp/precip gradient that follows latitude?

P23: The site descriptions include statements about previous sampling and burn intervals, but provide no information about biomass accumulation. A table presenting biomass values for different times since fire at each site is necessary to determine if the model results make sense.

P28: How was wildfire superimposed? There were three different intervals, but how did the size vary? Was there any interaction between time since prescribed fire and wildfire

BGD

12, C7927–C7929, 2015

size? The effects of wildfire are important for the overall prescribed fire-C emissions story and this aspect of the modeling needs to be better described. Citing Allen et al. (2013) for details is insufficient.

P33 L2: The authors did not evaluate the effects of productivity drivers and cannot actually say anything about the influence of climate on productivity.

Table 2: Closspb200? Why not cumulative C emissions?

Fig2: How is it possible that the Moor House litter value is constant? Calluna starts at zero following fire, but litter starts at 9? If the fire is sufficient to completely combust all of the Calluna, it seems logical that it would combust the majority of the litter as well. Without having the site specific data, there are two possibilities: 1) either the model is parameterized incorrectly, or 2) the field data have error.

Interactive comment on Biogeosciences Discuss., 12, 17817, 2015.