Biogeosciences Discuss., 7, C638–C641, 2010
www.biogeosciences-discuss.net/7/C638/2010/

Biogeosciences Discussions

Interactive comment on "Fire dynamics during the 20th century simulated by the Community Land Model" *by* S. Kloster et al.

S. Kloster et al.

sk993@cornell.edu

Received and published: 21 April 2010

We thank the reviewers for their constructive comments and suggestions. We hope to have addressed all raised issues in our comments on the individual reviews.

Anonymous Referee 2:

Specific comments:

1.: The authors note that inclusion of fire suppression effects gives a better result than inclusion of ignition effects alone. However, results in Table 4 indicate that in most regions, the correlations are not improved by the inclusion of these anthropogenic terms.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Table 4 lists the correlation coefficients of the interannual variability for the time period 1997-2004 between model simulations and satellite-based observations (GFEDv2 and GICC). We see only minor improvements in some regions when we account for anthropogenic effects (human fire ignition and fire suppression) in the simulated interannual variability. The simulated interannual variability is mainly driven by interannual changes in moisture conditions. However, the inclusion of fire suppression gives better results in terms of the spatial fire distribution. This is reflected in the global spatial correlation coefficient between model simulation and satellite-based observation that for example increases from 0.33, for a model simulations that does not take into account fire suppression, to 0.52, for a model simulation that includes fire suppression as a function of population density (simulations AB-HI and AB-HI-FS, respectively; see Figure 2). We modified the text to clarify this:

Page 577/Line 3 From: "The best spatial correlation between simulation and GFEDv2 as well as L3JRC is found for the AB-HI-FS simulation (0.52 and 0.53, respectively). Taking into account human ignition and fire suppression explicitly as a function of population density (AB-HI-FS), improves the simulated annual area burned over densely populated regions such as India, Europe and the East coast of the USA in comparison to GFEDv2 and L3JRC."

To: "The best spatial correlation between simulation and GFEDv2 as well as L3JRC is found for the AB-HI-FS simulation (0.52 and 0.53, respectively). Taking into account human ignition and fire suppression explicitly as a function of population density (AB-HI-FS), improves the simulated annual area burned over densely populated regions such as India, China, Europe and the east coast of the USA in comparison to GFEDv2 and L3JRC. When only human ignition is considered (AB-HI) the spatial correlation coefficient is lower (0.33 and 0.34, respectively)."

and

Page 580/Line 2: From: "The explicit treatment of human ignition and fire suppression

BGD

7, C638–C641, 2010

have only a small impact on the interannual variability between 1997 and 2004."

To: "The explicit treatment of human ignition and fire suppression have only a small impact on the interannual variability between 1997 and 2004, which is mainly controlled by interannual changes in moisture levels."

2.: I would like to request the authors explicitly state and discuss the spatial scales involved in the parameterization of population density effects. The reference (Klein Goldewijk, GBC 2001) indicates a scale of 0.5 degrees, is that the scale used in the CLM parameterizations?

We added the following sentence to the model description to clarify this:

Page 597/Line14: The population density is regridded from a 0.5 x 0.5resolution to the model resolution applied in this study (1.9 x 2.5).

We also added a paragraph in which we discuss the limitations of this approach:

Page 598/Line 11: To parameterize human ignition and fire suppression as a function of population density is an initial step to account for the human impact on fires in a global model. In reality, these anthropogenic impacts are much more complex. The effectiveness of fire suppression depends, for example, on how accessible a fire is to fire fighters and what fire management strategies are enforced (DeWilde and Chapin, 2006). Human ignition critically depends not only on population, but also on socio-economic factors (Chuvieco et al. 2008). Higher spatial resolutions or the explicit inclusion of urban developments (Jackson et al., 2010) will, for example, help to improve the representation of anthropogenic impacts. This should be explored in more detail in the future.

We added the references:

DeWilde, L. and Chapin III, F.S., Human impact on the fire regime of interior alaska: Interactions among fuels, ignition sources, and fire suppression, Ecosystems, 9, 1342-1353, doi:10.1007//s10021-006-0095-0, 2006.

BGD

7, C638–C641, 2010

Chuvieco, E., Giglio, L., and Justice, C., Global characterization of fire activity: toward defining fire regimes for earth observation data, Global Change Biology, 14, 1488-1502, doi:10.111/j.1365-2486.2008.04585.x, 2008.

Jackson, T., J. Feddema, K. Oleson, G. Bonan, and J. Bauer, Parameterization of urban characteristics for global climate modeling, A. Assoc. Am. Geog., in press

Minor notes:

Page 2: "Parameters can be parametrized" - Changed

Page 2: PFT == "Plant function type" spell out first use - Changed

Page 2: "tress" => "trees" - Changed

Page 5: if you report a spatial correlation, you must state the spatial resolution

We added the information on the spatial resolution of the model into the model description 2. We changed:

Page 569/Line 16: "All simulations in this study were performed with a modified version of the Community Land Model version 3.5 (CLM3.5, Oleson et al. (2008b), Stoeckli et al., (2008)).

To:" All simulations in this study were performed with a modified version of the Community Land Model version 3.5 (CLM3.5, Oleson et al. (2008b), Stoeckli et al., (2008)) applied with a resolution of 1.9ox2.5o. "

Interactive comment on Biogeosciences Discuss., 7, 565, 2010.