

## ***Interactive comment on “A process-based fire parameterization of intermediate complexity in a Dynamic Global Vegetation Model” by F. Li et al.***

**Anonymous Referee #1**

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It was a pleasure reading this paper. A well put model, clearly described, accompanied with necessary well-designed plots and informative tables. The presented model offers (at last!) a great improvement over the old DGVM fire modules which were not providing too realistic results (this old-known fact is well illustrated by the authors). I'd be glad to see such work published.

Comments:

- I absolutely agree with changes suggested by S. Lewis.

— Abstract, p.3234 -line 5: "Burned area in a grid cell is estimated by the product of fire 5 counts and average burned area per fire count"

-line 24-25: "the average relative error of simulated trace gas and aerosol

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emissions due to biomass burning is 7 percent" - This is only an error relative to a specific database, which must be specified here. Estimates of fire gas and aerosol emissions vary greatly. The GFED database you use is though a relevant global reference, but nevertheless it is only one of several available estimates of biomass burning emissions, and as such should not be treated as an absolute measured data.

—Par. 2.1.2. - Fuels availability, p 3241 - You have deduced your biomass thresholds (B-low and B-up) and anthropogenic ignitions constant from information on 24 grid cells in US. Why only US, and why only 24 grid cells? Reading Appendix-A it looks like you could do same analysis globally which would give much more appropriate estimate for a global model?

—p.3242 - line 8: RH-low and RH-up values. Although this selection of values sounds quite reasonable, how do similar estimates from other parts of the world compare with these values?

—2.2 Fire spread. p.3246 -line 11: you take average fire duration as 1 day. Does this mean that even if conditions are flammable and there is fuel in the adjacent down-wind cells, the fire will not propagate after 1 day of burning? While apparently OK for most fires, you miss the largest catastrophic fires this way. Have you tried to relax the 1 day limit for, say, cases with highly flammable conditions, strong winds and high fuel abundance?

— 4. Data. p. 3251 - line 19: "Burned area and fire emissions ~~data~~ estimates..."

—5.2 Fire emissions p 3254 - line 21: " ...the simulated emissions of all types of trace gases and aerosols are in good agreement with the GFED3 products, and the average of relative errors is 7 percent" - Well, this is no great wonder. GFED burned area and fire emissions estimates are closely related. So if you get good agreement between modeled and GFED burned areas, and you use pretty much same scheme for emission factors, you should get agreement in fire emissions.

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—caption of Fig. 7: "...observations estimates from GFED3...".

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