

Interactive comment on “Numerical simulation of tropospheric injection of biomass burning products by pyro-thermal plumes” by C. Rio et al.

Anonymous Referee #2

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This paper aims to generate global-scale simulations of wildfire injection, using a mass-flux parameterization of plume rise. This is an important next-step, beyond regional plume rise studies; in this case, it is aimed specifically at reproducing the diurnal CO₂ cycle in the middle and upper troposphere.

1. Page 4. I'm wondering if the units of “d” above Equation 1 are not “depth” (m), but rather “biomass burn rate per unit area” (kg-m/s), for Equation 2 to work out. On Page 9, however, d is given in meters. . .
2. Page 5, top. It might be clearer to describe alpha as the “fraction of a grid cell covered by the plume,” rather than “the fractional cover of the plume.”
3. Page 5, Equation 5. I'm having another units question, regarding the second (buoy-

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ancy) term on the right side. This term seems to need units [$\text{kg}\cdot\text{m}^{**2}/\text{s}^{**2}$], so might some function of density, or mass/length be missing?

4. I guess a general note is in order here – I've tried to re-derive the equations, and I'm having difficulty. This might be a matter of incomplete definitions, typos, or my lack of familiarity with this specific model, but I'm unsure about reviewing the Results sections being so unclear about the model.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 18659, 2009.

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