

Interactive comment on “Evaluation of the smoke injection height from wild-land fires using remote sensing data” by M. Sofiev et al.

Anonymous Referee #2

Received and published: 28 December 2011

Overall, this is an excellent and substantial contribution to a critical area of uncertainty and active research in chemical transport modeling. The paper is well structured and the approach is promising. My most critical comment is that the paper should be re-edited by a native English speaker. There are grammatical oddities sprinkled throughout the manuscript.

Specific Comments: 27941 (11-12): In the Briggs equations, U is the horizontal wind speed. The definition provided in the draft is confusing, as it could be confused with a vertical wind speed.

27942 (13-15): I don't understand how the Freitas 2007 reference connects to this list of models. It does not mention VSMOKE. A proper VSMOKE reference would be: Lavdas, Leonidas G. 1996. Program VSMOKE–Users Manual. Gen. Tech. Rep. SRS-

C13662

6. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 156 p.. Also, both FEPS and VSMOKE apply a modified version of Briggs to estimate plume injection height. Finally, consider adding Daysmoke to your list of 1-d models: Liu, Y.; Achtemeier, G. L.; Goodrick, S. L.; Jackson, W. A., Important parameters for smoke plume rise simulation with Daysmoke. Atmospheric Pollution Research, 2010, 1, 250-259.

27944-27945: Please explain all of the terms in your equations, even the ones that seem obvious to you. Examples of symbols that are not defined include ρ_a and g .

27947 Equation 10: It seems that the successful application of this equation will depend on the quality of both the modeled boundary layer height and the remotely sensed FRP. Can you comment on the uncertainty in the FRP values from MODIS and the boundary layer calculations in global scale models?

27948 (9-10): I don't believe you can conclude that the identified parameters are stable with regard to input data set by considering only North America and Siberia. While these data sets cover a range of ecosystems and fire regimes, they do not include anything resembling biomass burning in the tropics. The analysis would need to be extended to include at least an area such as Brazil or Indonesia before declaring the parameters universal.

27949 (Section 5.1): This is an interesting method for estimating fire size from MODIS active detects alone. Can you reference another study that uses this technique. If not, can you provide a figure showing the results of applying the equations? Without either of these, it is difficult to assess this technique, and thus difficult to compare the new method with BUOYANT.

27951 (16-18): Could you provide more discussion as to why wind speed is unimportant for wildfire plume height? What is the fundamental difference between wildfire plumes and stack plumes that makes this so?

27953 (2-4): This does not seem that noteworthy, as the training data set is dominated by ABL fires.

27961 (Fig 1): At least by eye, your results appear flat compared with the MISR observations. That is, the method underpredicts low heights and overpredicts high heights. Is there no parameter in the equation that will adjust this slope? Can you comment on this in the discussion?

Technical Corrections: As mentioned in the summary, this manuscript could benefit from a native English editor. In particular, the use of articles is nonstandard. For example, 27938 (24-26): "Bulk of the atmospheric models considering the fire emissions distribute the emitted smoke plumes homogeneously starting from the ground up to some height H_p , which is prescribed, sometimes as region-dependent." might be rewritten as: "The bulk of atmospheric models considering fire emissions distribute emitted smoke plumes homogeneously, starting from the ground up to some prescribed height H_p , which is sometimes region dependent."

27949 (22-23): What do you mean by "hardly possible?" Do you mean to say that it is not possible? Or, are you saying that it is possible but very difficult. If you mean not possible, I suggest changing this to say "not possible."

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 27937, 2011.