Response to the comments of Reviewer #2.

Thank you very much for the comments! Below, we answer them one-by-one.

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. Corrected

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- 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. Corrected

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 rho_a and g.* Done

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? This comment opens the discussion section of the paper

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.

The sentence has been removed.

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.

The approach is based on (Dozier, 1981). A missing reference was added.

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? This is a very difficult question, which requires further research. A recent study of Freitas et al 2010 sheds some light on it and suggests the mechanism, which has to be tested (the study is exclusively based on model computations). We added the reference and extended the discussion.

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

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?

In fact, the whole free-troposphere plume discussion was built to address this problem. In the revised version, we made it more explicit.

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 "n^A_L re emissions distribute the emitted smoke plumes homogeneously starting from the ground up to some height Hp, which is prescribed, sometimes as region-dependent." might be rewritten as: "The bulk of atmospheric models considering emissions distribute emitted smoke plumes homogeneously, starting from the ground up to some prescribed height Hp, 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."

The paper was carefully read to eliminate the errors and correct odd sentences.