Response to Review #2

We thank the referee for the careful review and constructive comments. We made minor corrections to the manuscript based on the referee comments. Below please find our responses to these comments (in blue).

The methodology is well documented and the differences with other inventories are thoroughly discussed. The discussion on applications and impacts in modeling is a good addition. The manuscript is very well written and easy to follow.

We are pleased to hear that the paper is well-received.

1. The PM category "PM2.5* = PM1-PM5" is not very clearly defined. Is it PM between 1μm and 5μm? Why report this particular category, which is not very common? I think some clarification is needed here.

Fresh BB PM emissions typically exhibit a bimodal size distribution with peaks near 0.3 and 10 microns in diameter and a valley from 1 to 5 microns (Figure 1). Cyclones or impactors are often used to select particles below/above a nominal aerodynamic diameter based on their inertia in a flow, but the transmission curve is sigmoidal, with 0-100% transmission typically occurring over a span of approximately 2 microns (Figure 2). The 50% cutoff is used as the nominal aerodynamic diameter that is 'selected' by a cyclone, for example, when used under specific conditions. In practice, especially in airborne use, the conditions (such as flow rate) may vary, shifting the 50% cutoff diameter higher or lower, e.g., with slower/faster flow. This is sometimes measured in experiments, which then report, for example, 'PM3.5.' For our purposes, since PM1 typically accounts for about 80% of PM2.5, and 2.5 microns is in an extended valley in the size distribution, we have binned reported EFs for PM1 through PM5 to build statistics for what is mostly fine, mostly organic particulate matter. We maintain separate categories for PM10 and TSP, which, in contrast, may contain more entrained dust, debris, and biological fragments.

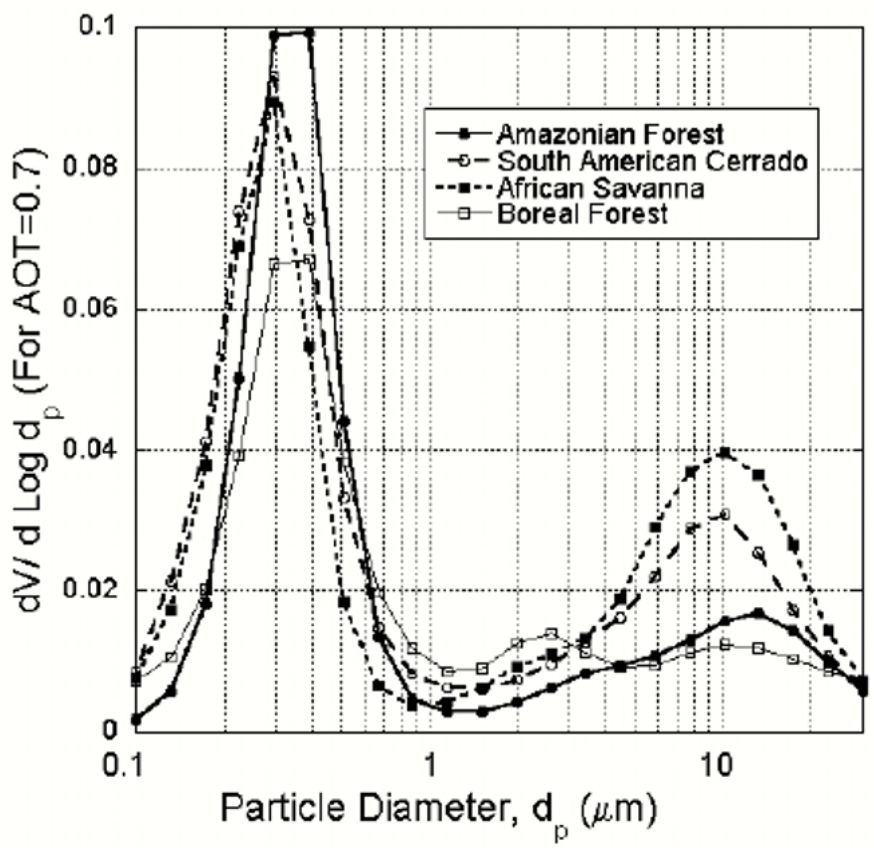

Figure 1: Retrieved AERONET particle size distributions for a 440 nm Aerosol Optical Depth (AOT) of 0.7. (Reference-Reid, J. S., Koppmann, R., Eck, T. F., and Eleuterio, D. P.: A review of biomass burning emissions part II: intensive physical properties of biomass burning particles, Atmos. Chem. Phys., 5, 799–825, doi:10.5194/acp-5-799-2005, 2005.)

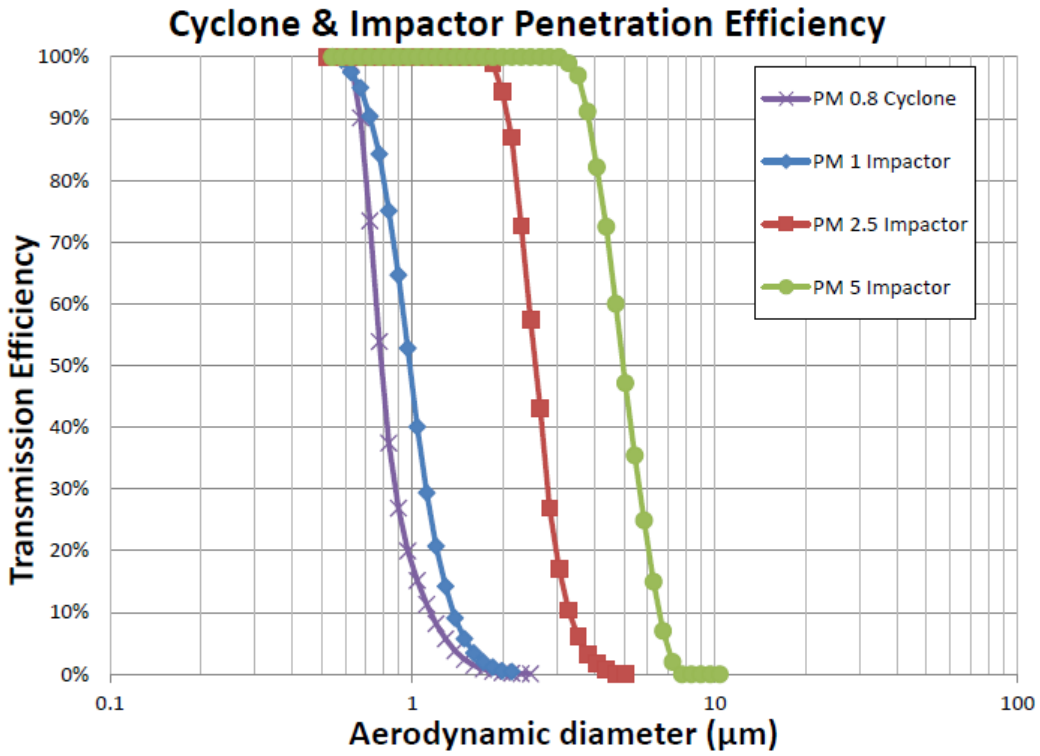

Figure 2: PM transmission sigmoidal curve from TSI.

We have added the following sentence to the main manuscript to improve clarity:

$PM_{2.5}$* subcategory accounts for the fact that fine or accumulation mode PM may be reported at multiple size cuts (e.g., PM_1, $PM_{3.5}$) based on instrument specifications and operating conditions.

2. Section 5: the manuscript is generally quite long and I do not think Section 5 helps the manuscript, especially since the GitHub is well commented and documented. I would take out Section 5 or move it to supplementary material.

We agree with this reviewer regarding the length of Section 5 and duplication with information on GitHub. We also think that the tables themselves highlight contents of the database that were not described in any detail in the main manuscript. In response to this comment, we have moved this section to an appendix, so that it stays with the manuscript but not in line with the more important text.

3. Supplementary material: some references need fixing ("Error! Reference source not found." several times)

The SI Table references have been updated and the "error" appearances have been corrected in the SI.