Review of "Direct radiative effect of the Russian wildfires and their impact…" Péré et al.

This is an interesting case study of the impacts of BBA. My main comments are:

(1) There is limited use of available observations to evaluate the impacts of the BBA in the model. The paper refers to surface irradiance observations, it would be useful to use these to evaluate the model. There are several radiosoundings available (and more 2—m observations, from outside Moscow). These could be used to evaluate the impacts of the direct effect on the boundary layer, low-level stability and dynamics (e.g. just plot tephigrams from obs, control and model with BBA impacts). Are these impacts enough to alter the circulation significantly?
(2) Presentation of the precision and accuracy of the model. There are numerous times when it is stated that there is "good agreement" etc (e.g in conclusions "well captured", "relatively well" & "good agreement"). These are slightly meaningless, as one person's "good" is another's "bad". Please be quantitative where possible. Good enough for what? You have this quantitative information. This raises point 3 below.
(3) Given the model observation differences what are the implications? *i.e*. please state the limitations of your study. Fig 2 shows a disagreement of a factor of 2 – how much does this mater? Fig 6 b shows CHIMERE misses large particles? What are expected consequences? Model does not include longwave aerosol effects – does this matter? CHIMERE top is 500 hPa – is this important? What is the main limitation: aerosol properties or their vertical transport (which affects subsequent advection)? How much does the offline nature of the model coupling matter? This makes your model evaluation much more useful.
(4) Some of the presentation needs tidying up – some language would be greatly improved by a native speaker, some figures are unclear/too small (noted below)

Specific Comments

15839 line 17 "the model is not "within or close to the uncertainty range of observations". May be "The model is within or close to the uncertainty range of observations except at 2 to 4 km".

15834 Line 10 These processes are microphysical not "dynamical"

15834 CHIMERE extends to only 500 hPa. CALIOP shows BBA to 5km. How much does this 500 hPa lid matter?

15835 line 27 "explicitly resolved" is unclear. Are they parameterised ? May be "are not represented" is probably better

15842 lines 16 to 20. After this quantitative comparison this summary paragraph is too vague and can be much more precise about what the model can and can't do and how this affects your conclusions.

15844 lines 23 to 24, Please refer to Fig 9b here (I missed this on a first quick read).

15845. Please compare with radiosoundings.

I don't think Fig 10b is required? If surface sensible flux is decreased entrainment will decrease. This vertical velocity is not resolved by the model (and must be parameterised from the surface sensible flux?)

Language

15831 Line 12 "lower five kilometres of the atmosphere" is better I think.

15834 line 5 "extends from 43.40" is better I think.

15834 Line 15 "soil dust is"

15838 line 1 "no POLDER data are available"

Line 11 "rather well" what does this mean? (See above)

15841 line 29 (um3 um-2) does not need a dot

Conclusions – would be much better in multiple paragraphs. Please discuss limitations (see above).

Figures

Fig 1 is too small. Dates are far too small to read (as is colour bar). Please label Moscow. It would be useful to say show mean sea-level pressure and 300 hPa winds (or similar) to show meteorology controlling advection and briefly discuss this.

Fig 2 . This is one profile. How does the rest of the CALIOP transect compare?

How do you have CHIMERE data above 500 hPa?

Fig 3. Caption says this shows Moscow observations. If it does they are too small to be seen.

Fig 9b should be "($^{\circ}$C)" or ("K")