

## Response to Editor

*There is only one minor issue that I would like you to address before accepting your manuscript for publication: the description and interpretation of the CAMS modelling system could be improved. First, it is referred to as an "aerosol transport model" but CAMS goes beyond that and includes a sophisticated assimilation system. Hence, the finding that "The aerosol plume reproduced by the model is very close to the one actually observed by MODIS." is not very surprising as CAMS assimilates MODIS (with fairly small errors so at assimilation time it is very close to MODIS indeed). However, the well reproduced vertical structure is not based on explicit assimilation, which is something worth mentioning. As a whole, a short introduction to CAMS, including which relevant aerosol properties are assimilated and which are not would strengthen this aspect of the manuscript. This could also be pulled through into the relevant discussions.*

Yes, the editor is right, the AOT MODIS data are assimilated into the CAMS model, but not the notion of vertical aerosol distribution. We have therefore clarified these points in the paper and have better highlighted the result as to the observed agreement between modelling and lidar observation for the vertical distribution of aerosols.

We have thus added the sentence " The aerosol vertical structures appear to be well reproduced using atmospheric composition reanalyses from CAMS when comparing with lidar-derived vertical profiles." In the abstract.

In subsection 4.2 we have nuanced our comments by modifying the text as follows: " As CAMS assimilate the MODIS-derived AOT (Benedetti et al., 2009; Inness et al., 2018), the aerosol plume reproduced by the model is very close to the one actually observed by MODIS. However, the advantage of the chemistry-transport model is that it provides the chemical and optical speciation of the aerosols in the plume."

We have also added the sentence "It is noteworthy that the vertical distribution of aerosols is not constrained in the assimilation process, as opposed to the horizontal distribution of aerosols." in subsection 4.4.

And we have changed the beginning of the conclusion: "This study has shown a very strong consistency between airborne lidar observations, passive and active satellite instrumentation. All these measurements are also in very good agreement with the CAMS aerosol reanalysis products, and in particular with regard to the vertical distribution of aerosols."