

## ***Interactive comment on “Probing into the aging dynamics of biomass burning aerosol by using satellite measurements of aerosol optical depth and carbon monoxide” by Igor B. Kononov et al.***

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I thank Dr. Sayer for his interest in our paper. Of course, we have been aware that the MODIS data were being reprocessed and that the Collection 6 has been released. However, when we configured our study in January-February of this year, the Collection 6 AOD data had not yet been made available through the Giovanni interactive visualization and analysis system (<http://giovanni.gsfc.nasa.gov/giovanni>) operated by NASA. Consequently, on the one hand, we could not be sure that the reprocessing of the MODIS data had been accomplished and the Collection 6 dataset for 2012 had been finalized and verified. On the other hand, we would not be able to ensure (by using the visualization tools and corresponding Level 3 data which are provided by the

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Giovanni system) that we processed the Level 2 data properly and our dataset is complete. Nonetheless, by comparing the different versions of the Level 2 data that were then available through ftp, we made sure that the differences between the Collections 5.1 and 6 data projected to our model grid were small compared to the differences between our modeled AOD data and any of the MODIS AOD data, and so we presumed that the differences between the Collection 5.1 and Collection 6 data were unimportant in the context of our study.

To get a better idea about possible effects of the changes in the MODIS data on the results of our study, I downloaded the Collection 6 Level 3 AOD data (now available through Giovanni) for the two days (21 and 22 July) which were analyzed in the Supplementary material for our paper and then combined the Aqua and Terra data together (such that if the data for a given grid cell were available from the both satellites, they were averaged). In the same way, I also combined the Collection 5.1 Level 3 data from Aqua and Terra satellites. Finally, the both data sets were used in the analysis illustrated in Fig. S6 instead of the original dataset (based on the Collection 5.1 Level 2 data) used in our study. The results are shown in the graphical supplement for this comment. It can be seen that although the regression coefficients representing the enhancement ratio for AOD with respect to CO columns are insignificantly smaller (by about 15 percent) in the case with the Collection 5.1 data, the difference between the values of the regression coefficient for the source and "receptor" region is even slightly increased with the Collection 6 data. This means that, qualitatively, the conclusions which can be made for this situation by using the Collection 6 data remain exactly the same as the conclusions that were made with the original data (see the Supplementary material for our manuscript). It is also noteworthy that the differences between our modeled AOD data and any of the MODIS AOD data are typically much larger than between the corresponding Collection 5.1 and Collection 6 data.

Furthermore, by considering all the Level 3 data available for the study region for 22 July, I found that the correlation coefficient between the Collection 6 data and our mod-

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eled data remained about the same as in the case with the Collection 5.1 data ( $\sim 0.67$ ). So I could not find clear evidence that the use of Collection 6 data would lead to a reduction of uncertainties in our results (although this does not mean that the Collection 6 data are less accurate than the Collection 5.1 data). Taking into account the results presented in Fig. 7a (specifically, the fact that the CO column amounts corresponding to the BB plumes considered do not change significantly with the photochemical age of the plumes), I also do not see how correcting a minor bias in the Collection 5.1 data for dense BB plumes can invalidate our findings indicating major changes in AOD due to BB aerosol ageing, as well as I cannot imagine any solid reason for significant changes in our results due to better identification of small inland water bodies in the MODIS retrievals. On the other hand, I noted that the number of data points provided in the Collection 6 dataset has slightly decreased with respect to the Collection 5.1 dataset; it means that the use of the Collection 6 data could potentially result in larger uncertainties in the results of our analysis.

Accordingly, I'm confident that the major findings of our study cannot be affected by differences between the Collection 5.1 and Collection 6 data. I hope for the understanding that so much as re-processing of satellite data may take years, a complex analysis involving model data cannot be re-done overnight after the release of a new version of satellite retrievals. I think that some transitional period should be allowed in this regard. Note that the MODIS measurements were involved in our calculations of photolysis rates; so in order to replace the Collection 5.1 data with the Collection 6 data, we will need to fully re-do not only our analysis but also the underlying simulations with a chemistry transport model. I strongly believe that such a significant effort would not be worthwhile. I believe also that there is common understanding that the fact that the Collection 5.1 MODIS data is now superseded by the current Collection 6 does not invalidate numerous studies in which the Collection 5.1 (and older) data were involved.

Finally, I would like to thank Dr. Sayer for his kind offer of help with using the Collection 6 data. I will be happy to contact him in case any relevant questions arise in our work,

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and I hope that this discussion will initiate mutually useful collaboration.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/acp-2016-797/acp-2016-797-SC2-supplement.pdf>

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