Reply to Anon Review #3

We thank the reviewer for their helpful and insightful comments. Please see responses to specific comments below.

1. Page 6069: Line 10: I believe that SOA contribute to aerosol radiation interaction in WRF-Chem. Please check.

There is no SOA in the standard release of MOSAIC in WRF-Chem, there is only primary OA. SOA has been added with the VBS. To the author's knowledge, in the standard release of the VBS in WRF-Chem, there are no aerosol-radiation interactions or aerosol-cloud interactions. Although these may have been developed in later versions, but the point remains that there are no SOA-radiation interactions in WRF-Chem because there is no SOA.

2. Page 6069, Line 20: Change "efficiently" to "efficient".

Thank you for spotting this typo, it has been changed.

3. Page 6069: It is always a good practice to number Tables and Figures in ascending order. Here Table 2 comes before Table 1. Similarly, Table 5 comes before Table 4 at Page 6082, Line 12 Please revise.

Thank you for this advice, the tables have been reordered.

4. Page 6086, Line 5-6: Did you try to look up MISR plume heights for South America?

After searching the literature, we have found Sofiev et al. (2013) do a global study of MISR plume height retrievals, including over South America. The story is similar to that already referenced. This reference will be included in the discussion at this point in the manuscript by replacing the lines:

"For example, in a review of North American tropical fire plume measurements, Martin et al. (2010) show 95 % of tropical forest plumes are below 1.5 km."

With

"For example, in a global review of MISR fire plume height retrievals Sofiev et al (2013) show the majority of daytime August wildfire emission plumes are below 2.5km in altitude over Amazonia."

Sofiev, M., Vankevich, R., Ermakova, T. and Hakkarainen, J.: Global mapping of maximum emission heights and resulting vertical profiles of wildfire emissions, Atmos. Chem. Phys., 13, 7039–7052, doi:10.5194/acp-13-7039-2013, 2013.

5. Page 6089, Lines 10-16: Please give some statistics to quantify the model performance. For example, average and standard deviation Of AODs, spatial correlation coefficient and mean bias would help.

Please see the following table showing mean, spatial standard deviation and centered Pearson's product-moment correlation coefficient, comparing AOD at 550nm from the two model scenarios with the combined MODIS Terra and Aqua satellite data.

Dataset	Phase I			Phase II		
	Mean	Standard Deviation	Correlation coefficient	Mean	Standard Deviation	Correlation coefficient
MODIS	0.321	0.190	N/A	0.221	0.131	N/A
Standard 3BEM	0.355	0.129	0.678	0.285	0.117	0.623
Modified 3BEM	0.381	0.155	0.732	0.286	0.131	0.591

The data is discussed with the following text in section 5.2:

"Mean, standard deviation and spatial correlation coefficients of AOD for Phases I and II are given in Table 6. Compared to the standard 3BEM emissions scenario the modified emission scenario shows higher mean AOD in both Phases, stronger correlation in Phase I, but weaker correlation in Phase II.

6. Page 6088, Line 24: I guess you mean combined Terra and Aqua.

Yes, combined Terra and Aqua, thank you for pointing out this error.

7. Figure 3, caption: I think b and d are for WRF-Chem, not b and c.

Thank you for spotting this typo, it has been changed.

8. Figure 4, caption: Do you mean light instead of Bight?

I meant "Bright" instead of "Bight". This has been changed.

9. Figure 5, caption: change agains to against.

Thank you for spotting this typo, it has been changed.