

**We thank the reviewers for their supportive and thoughtful comments. Our responses to the comments are provided below in a red font, with the reviewers' comments in a black italicized font.**

### **Review #1**

#### ***General Comments:***

*The authors have provided a thoughtful consideration of my earlier comments. I am happy with the overall quality of the manuscript. I still recommend a few adjustments in the minor comments, but I will be happy to recommend publication after these small suggestions are at least considered.*

Thanks for the reviewer's support. We have addressed all the concerns. Please see our point-by-point response below.

#### ***Specific comments:***

*l. 541 It made me confused when I read a DOD value higher than the AOD. I went to the references mentioned and saw that the DOD of 0.18 was found in the strongest dust event measured, while the AOD of 0.14 is the average value during dust events. Maybe you should rewrite this sentence to make this clearer, as now it might be confusing.*

Sorry for the confusion. We have revised this sentence into: "Consistent with our results, previous studies by Baars et al. (2011) and Baars et al. (2012) reported an average AOD (532 nm) of ~0.14 when affected by the influence of Saharan dust at a similar Amazon site (60° 2.3' W, 2° 35.9' S), during which the DOD (532 nm) could be up to 0.18."

*l. 560 I think you meant "exists" instead of "exits".*

Thanks for pointing out this mistake. We have corrected the typo.

*l. 642 You discuss the matter of the compensation of hydrologic losses of nutrients by Saharan dust in section 4.3.3. In the paragraph starting in line 589 you present values and discuss uncertainties. You discuss that the dust nutrient input could compensate for the hydrologic losses, but the amount of compensation depends on a few uncertainties. Just by comparing the estimated hydrologic losses presented in that paragraph with the estimated inputs you show in line 641, one sees that the dust nutrient inputs might not be enough to compensate for the losses all by itself. As you correctly wrote in line 607, more work is required in order to have clearer answers on that. For that reason, I would*

*be more careful with the wording in line 642. “Which may well compensate” might lead the reader to conclude that the dust nutrients input is more than enough, while your own results show that this might not be the case.*

Thank you for the nice suggestion. The estimated input of phosphorus is within the range of its *hydrologic losses* but the input of magnesium is much less than its *hydrologic losses*. Considering the uncertainties within the estimates, we agree with the reviewer that the wording “Which may well compensate” might cause some misleading. We have now modified the corresponding text in line 595-602 to make the description more clear: “On the other hand, Vitousek and Sanford (1986) reported a loss of 0.8 – 4 mg m<sup>-2</sup> yr<sup>-1</sup> for phosphorus and 810 mg m<sup>-2</sup> yr<sup>-1</sup> for magnesium in Brazilian ecosystem to surface waters. **Estimated annual phosphorous deposition flux of 0.97 ± 0.16 mg m<sup>-2</sup> yr<sup>-1</sup> into the Amazon Basin on average in our study is at the bottom end of the range of its hydrologic losses, implying that the nutrient input from African dust could to a large extent compensate the hydrologic losses of phosphorous in Brazilian forest ecosystem, although the deposition input of magnesium is much less than its hydrologic losses.**”

We also revised the corresponding sentence (in both Abstract and Conclusion) from “which may well compensate” to “which may **to some extent** compensate”

*Table 3. I would include “estimated using (...)” in the title. To clarify that these are results of simulations under certain conditions. This information is already in the text, but I believe it is important to have this kind of information in the title or legend of tables or figures.*

Thanks for the comment. We have accordingly modified the title.

## **Review #2**

*I appreciate the authors' effort in revising the manuscript, particularly in response to the reviewers' comments, which necessitated a significant restructuring and reorganization of the paper. Most of my remaining comments have been satisfactorily addressed. However, the paper could benefit from a thorough grammar review. Nonetheless, I still have some minor comments below, and once these are addressed, I find the paper may be suitable for publication.*

Thanks for the reviewer’s thoughtful comments to help us improve the manuscript.

We have now addressed all the concerns, including the thorough grammar review.

Please see our point-by-point reply below.

1. *Abstract: Consider using relative percentage values instead of concentration values*

*for improved clarity.*

Thanks for the nice suggestion. We have revised the Abstract accordingly: **“African dust entering the Amazon Basin during the wet season accounts for  $40\% \pm 4.5\%$  (up to 70%) of surface aerosol mass concentrations over the basin.”**

*2. Introduction: L110, I don't think it is necessary to mentioned other species of biomass burning tracers and sea salt here.*

Thanks for the comment. We have deleted the sentence.

*3. Introduction, L135: please add the descriptions about the contents in each section.*

Thanks for the comment. We have added the description accordingly at the end of this paragraph: **“The paper is organized as follows: Section 2 describes the model setup for dust simulation and the observational datasets applied to constrain the model results; Section 3 gives the model evaluation regarding the simulation of the export of African dust towards the Amazon Basin; Section 4 presents the model results, including simulated dust emissions in Africa, the trans-Atlantic transport of African dust, and the influence of African dust over the Amazon Basin; and Section 5 summarizes the main conclusions drawn from this study.”**

*4. L157: Delete the word "and" to enhance sentence flow.*

Done!

*5. Section 4.2, L428: It is advisable to emphasize that these values are GEOS-Chem model-based and subject to model dependency.*

Thanks for the nice comments. We revised the corresponding text into: **“The GEOS-Chem results in this study are consistent with this seasonal oscillation: although higher dust load over the coastal region of North Africa is found in boreal summer ( $> 500 \text{ mg m}^{-2}$ ), dust reaching the Amazon Basin is less than  $10 \text{ mg m}^{-2}$ ; In contrast, dust load over the Amazon Basin could reach up to  $50 \text{ mg m}^{-2}$  in boreal spring and winter.”**