Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2018-129-AC1, 2018

Biogeosciences Discussions

Interactive comment on "Integrating Multi-Media Models to Assess Nitrogen Losses from the Mississippi River Basin to the Gulf of Mexico" *by* Yongping Yuan et al.

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Received and published: 4 July 2018

GENERAL COMMENTS:

In this manuscript, the IMS framework was developed to incorporate multiple models such as the SWAT, WRF, EPIC, and etc. In general, the manuscript is well-written. On the other hand, I would like to see more details/rationales about the framework:

Response from AUTHORS: Dear Referee, thank you for the time you devoted to reviewing this manuscript and for your valuable comments. We carefully considered your comments and will take them into account for further revisions. In the first two

paragraphs of the introduction, we talked about the need for an Integrated Modeling System (IMS) linking air, land surface, and stream processes to fill the research gap for integrated, multi-media modeling for N studies in large river basins (page 3 line 22 to page 4 line 2). The next step would be to select air, climate, land surface, and stream processes models for this integrated system; thus, we started to talk about the existing system FEST-C and we were debating to put more details regarding this system in introduction or methods; then we decided to put more details on this system in method section. . .; following your suggestions, we elaborated more on why we used those models. More details can be found below.

Comment 1. The first issue is the selection of different models. It seems that the combination of SWAT, EPIC, WRF, and others are more or less a subjective decision. Can you elaborate why these models are chosen in the first place? Otherwise, maybe we can also do the same thing by using HSPF or perhaps other models.

Response from AUTHORS: It is not subjective, and we added more detail in the introduction to elaborate why these models are chosen.

Comment 2. In the current format, we can find EPIC, WRF, and CMAQ in Section 2.2. I suggest allocating them into subsections such as 2.2.1, 2.2.2, and 2.2.3, instead.

Response from AUTHORS: Changes were made following your advices.

Comment 3. As mentioned in 2.7 that the given work was not validate through calibration process. It can be problematic since it may be difficult to evaluate the corresponding performance of the given framework. I'm not saying the authors have to conduct additional work on calibration. However, I believe more justifications are required to alleviate the associated concerns.

Response from AUTHORS: There are some misunderstand: although the given work was not calibrated, we performed model evaluation (or validation) through comparing simulation results with the USGS monitoring data as we descript in section 2.7 and

section 3.2 and 3.3). Furthermore, the given work builds on SWAT through HAWQS and FEST-C; and streamflow calibration was performed on SWAT previously by EPA-OW as descript in section 2.7 Model Evaluation, which are the justifications. We totally revised the section 2.7 and section 3.2 and 3.3 to increase clarity.

Comment 4. I suggest separating the Conclusions and Future Work to independent sections, since the developed framework will be very useful to most readers and they may want you to elaborate more ideas and potential opportunities in the near future.

Response from AUTHORS: Changes were made following your advices.

Comment 5. The quality of Figure 3, 4, 7, and 8 should be further enhanced in the next round. The current format is very much the version of default settings from Excel.

Response from AUTHORS: Figures 3, 4, 7, and 8 were enhanced following your advices.

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