Point-to-point Reply and Rebuttal to Anonymous Referee #3

Anonymous Referee #3

This manuscript presents an interesting dataset and addresses a relevant topic well within the scope of the journal: the contribution of Oceanic River's to the oceanic nitrogen and the factors controlling these exports. The study concludes two main points:

a)Danshui River exports much more DIN than previously thought by using global models.

b)Controls of DIN export change along the watershed –relevant information which should be taken into account by models.

The reviewer is correct. We now specified our objectives in the end of Introduction, showing the objectives of this study are (1) to explore the effective factors governing the DIN export and speciation; (2) to construct a more practical equation of DIN discharge for mountainous watershed. Results may serve as a scientific background for stream restoration and nutrient mitigation in Oceania rivers.

Although interesting, I think that the paper has two main weaknesses: first, lack of clarity in presenting and discussing the results probably because of limitations related to the language (i.e., there are several grammar and vocabulary errors that make understanding the message of the paper difficult).

Thanks for the comments and the corrections. In this revised manuscript, we've asked a professional editor to check the English of this article thoroughly and carefully.

And secondly, I think that the paper would be greatly improved by a more in-depth discussion. For instance, how these results can be extrapolated to the rest of the Oceanic Rivers? Is the Danushi watershed a typical example of developed watersheds in Oceania? All of them having agricultural headwaters and downstream urban areas? What would be the implications of having the reverse distribution?

Based on all the reviewer's comments, we have reorganized the entire manuscript by rewriting the Abstract, Introduction, adding new plots of C-Q relation into Results, giving examples of how Q controls the cumulative DIN export, and elaborating the stoichiometric relation between DO and DIN in Discussions, which should provide more in-depth discussion.

In the revised manuscript, we also specified the Oceania countries we refer to and summarized their characteristics. Their features, including watershed area, flow length, relief, and runoff, are similar with Danshui watershed (see Figure 6), implying Danshui River could be an estimator for Oceania. Besides, we do think the reverse distribution should be rare in the development of countries.

Presenting four different methods of calculating fluxes you would expect a discussion in why the difference in results and which are the methods used in the models.

As our responses to the Reviewer#1 and #2, four methods have their own advantages but none of

them could be individually suitable for use in any circumstances, which have been widely discussed in the previous studies. Using only one equation might raise doubts on subjective selection. It is important to note that using any one of the four flux estimates in this study will not much influence the inferences since the four estimates are so similar. Therefore, we take the mean value of the four estimates in this study.

Specific and technical comments:
P2499 L26 “well resources”? Do you mean “few”?

Removed as suggested by the Reviewer#2.

P2504 L15 There is a dot lacking between “day” and “Yield”

Added, and thanks for the kindly reminding.

P2505 L20 Wet season lowest DIN than dry season except at D03 –why is this site different?

In the revised manuscript, we extended our data from a single year to 3-4 year and did some more in-depth analysis. Hence, we removed the old Figure 4 and relevant paragraph.

P2507 L3-4 “Like in Dahan and Keelung River, DIN concentrations in the upstream sites were enhanced in wet season but were diluted in the downstream.” But in P2505 L19 referring to Dahan “mean DIN concentration in wet season was lower than in dry season except at D03”

Thanks for the careful reviewing. It indeed conflicts with the previous sentence. However, as mentioned above, since we redid the analysis by including more long-term data. The relevant sentences and paragraph changed..

P2507 L10 Regression details? Type of regression, number of cases, p value and alpha?

Sorry for the confusion. We haven’t done regression analysis in this paragraph. We used Pearson Correlation Coefficient, i.e. ρ, ranging from -1~+1 to present the linear correlation among DIN concentration and any one of the watershed characteristics.

P2508 L10 “use” instead of “sue”

Corrected.

P2508 L18 “show” or other instead of “demonstrate”

Corrected.

P2508 L20 “whole” or other instead of “all”

Corrected.

P2509 L25-26 Confusing sentence

Since we reorganized the Discussion, the sentence no long existed.

P2511 L22 “whole” or other instead of “all”

Corrected.

P2511 L27 Replace “do downstream” for “to downstream”

Replaced.

P2514 L16-18 “N fixation is stored within the watershed”, do you mean “N is retained in the watershed”? “For the upstream sites”, do you mean “The upstream sites”? These sentences are confusing.

As suggested by the Reviewer#1 and #2, we removed the N budget relevant paragraph in the revised manuscript.

P2515 L14 “. . . the sites is” instead of “are”

Corrected.

P2518 L3 “at given the”, do you mean “given the”?

Yes and removed “at”.

Table 1 and 2 It would be useful to include the distance from the estuary.

Thanks for your suggestion. Instead, we wrote down the tidal excursion distance in the caption. Tidal excursion distance is ~10-20km upriver, depending on tidal range and weather conditions. Readers could easily derive the distance from the estuary.

Fig 3. What is the discontinuous line? Is it a significant regression?

The dashed lines are simply schematic lines showing the general trend of concerned items. No statistics could be provided here. We added the relevant description in the caption to avoid confusion.