Biogeosciences Discuss.,
doi:10.5194/bg-2017-68-RC1, 2017
© Author(s) 2017. CC-BY 3.0 License.

Biogeosciences Discussions

Interactive comment on "Variation pattern of particulate organic carbon and nitrogen in oceans and inland waters" *by* Changchun Huang et al.

Anonymous Referee #1

Received and published: 9 April 2017

General Comments:

The authors have performed a review of variability in particulate organic carbon and nitrogen ratios in the world's oceans and inland waters. While the authors include a large amount of data for the ocean that is more or less globally representative, they consider 2 small temperate rivers and 7 different lakes, all located in the Northern hemisphere. There doesn't appear to have been any effort to incorporate data from the vast body of literature, rather data was only downloaded from websites with data readily available. For such a review to be meaningful, the authors need to spend considerable time mining the literature to collect a representative dataset. Not including large rivers in a global dataset is a massive oversight.

Currently I do not see any value in this review considering the massive gaps in the

data that was considered. The authors perhaps have a decent starting point with the assembled ocean datasets, but need to spend considerable time compiling the inland water data before any meaningful conclusions can be made. I have recommended some references to read through below to broaden perspectives on inland water biogeochemical cycling that will perhaps inspire a more in depth analysis.

Specific Comments:

Line 18: It would be perhaps more interesting to first list the difference between inland waters, oceans, and estuarine C/N averages, rather than just a global average. . .this comment was made before realizing how sparse the inland water dataset is.

Line 20: C/N variability in inland waters was attributed to "lake geomorphology, trophic state, and climate." This is a vast oversimplification, which is reflective on the manuscript in general. Rivers are not even mentioned, which are highly dynamic. For example, C/N ratios (either dissolved or particulate) can vary by several times over the course of a few hours in rivers/streams in response to rainfall. This concept is discussed in the following manuscript and the references therein and should be considered for further discussion in the manuscript:

Ward, N.D., Keil, R.G., Richey, J.E. (2012) Temporal variation in river nutrient and dissolved lignin phenol concentrations and the impact of storm events on nutrient loading to Hood Canal, Washington, USA. Biogeochemistry. 111 (1-3), 629-645

The above comment was made prior to realizing the inland water dataset only included lakes and 2 rivers. Now this focus makes sense. . .

Line 30-35: There are much more recent syntheses of global inland water CO2 budgets that should be mentioned if this is going to be the focal point of the first paragraph. For example, see the following refs. Raymond et al. (2013) increased the outgassing component to 2.1 Pg C yr. Sawakuchi et al., (2017) noted, that a large fraction of the surface area of the world's inland waters aren't accounted for. . .adding the complete

surface area just of the Amazon River increases the global budget to 2.9 Pg C yr-1. This progression and factors that are still missing from global budgets were discussed in the review paper by Ward et al. (2017):

Raymond, P.A., Hartmann, J., Lauerwald, R., Sobek, S., McDonald, C., Hoover, M., et al. (2013). Global carbon dioxide emissions from inland waters. Nature. 503(7476), 355-359

Sawakuchi, H.O., Neu, V., Ward, N.D., Barros, M.L.C., Valerio, A.M., Gagne-Maynard, W., Cunha, A.C., Less, D.F., Diniz, J.E., Brito, D.C., Krusche, A.V., Richey, J.E. (2017) Carbon dioxide emissions along the lower Amazon River. Frontiers in Marine Science. 4 (76)

Ward, N.D., Bianchi, T.S., Medeiros, P.M., Seidel, M., Richey, J.E., Keil, R.G., Sawakuchi, H.O. (2017) Where carbon goes when water flows: Carbon cycling across the aquatic continuum. Frontiers in Marine Science. 4 (7)

Line 50: See previous comment on Line 20. The factors controlling C/N in terrestrial environments and inland waters are grossly oversimplified. C/N in inland waters is not only a result of OM origin. Molecules are selectively leached from soils during mobilization into streams (or even the flow paths that come before this such as throughfall, stemflow, etc). Molecules are also selectively degraded and sorbed/desorbed during transport, influencing composition. The review paper mentioned above is a good place to start for honing the conceptualization and discussion of inland waters.

Line 80: After reviewing the list of data used, it is not surprising to see the lack of inland water discussion. There is one river dataset listed as far as I can tellâĂŤthe Ipswich and Parker rivers, 2 fairly small temperate rivers. The other inland water datasets are from 7 lakes. While the ocean dataset seems to be decently large, the attempt at a "global synthesis" of inland waters made here is non-existent. Where is the Amazon River, which makes up 20% of the freshwater flow to the ocean? How about the Congo River, the Ganges-Brahmaputra River, the Changjiang River, and all of the world's large

rivers? Not to mention streams from different settings.

I would recommend reading the following review from the 1980's that did a more comprehensive job than done here:

Meybeck, M. (1982). Carbon, nitrogen, and phosphorus transport by world rivers. Am. J. Sci. 282(4), 401-450

For this present study to be meaningful, the authors need to include the majority of robust datasets currently available in the literature. It appears the authors only used data that could be readily downloaded from websites, rather than making a true effort to mine the literature. They have ignored the entire body of inland water literature.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2017-68, 2017.