

## ***Interactive comment on “The fate of riverine nutrients on Arctic shelves” by V. Le Fouest et al.***

### **Anonymous Referee #2**

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The authors calculate the riverine nutrient input and fluxes to the Arctic Ocean and their influence on the primary production. In addition, they compiled DOC, DON, PON and POC data. They compiled the data from the last 50-60 years from various Russian stations and from 5 public databases. It is not described where most of the data originate from. The standard deviation of the monthly data is extremely high. Therefore it is important to know more about the origin of the data, e.g., how many data are from Russian stations and from the databases. It is also questionable if it is worthwhile to use all the historical data, and it is important to know if these data are responsible for the huge variations. Since the data are not used to calculate trends over the last 60 years the quality of the data should be carefully checked. It might be better to focus on the recent data from the databases. On the other hand the combination of the historical data with those of the databases is the major new aspect of the manuscript.

The finding that the discharge of riverine nitrate to the Arctic Ocean is only small is  
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a well known fact. Regenerated production may play a more important role for primary production. Since silicate is also exhausted in surface waters a nitrogen source, other than nitrate must be considered. Nitrogen is generally faster mobilized compared to carbon during decomposition and remineralization. I don't believe that photoammonification of refractory DON is an important process in contributing nitrogen. More important is a discussion about microbial decomposition of PON and DON which is discussed rather vague?

The manuscript is unfortunately neither a review nor a really new research paper. For a review it is too superficial. A lot of similar information is already published, e.g., by McClelland et al. (2012). The manuscript is not carefully prepared. There are a lot of major and minor flaws in the text and the figures. Chemical definitions are sometimes incorrect. Figure legends are partly incorrect or not detailed enough, etc. The figures are not in a style for publication.

Results and discussion Is there any statistical significance between the monthly concentrations of the rivers and between the different rivers? The huge variation of the data may probably prevent any significance. This should be written somewhere. I am missing any statistics. I propose to discuss ranges of PP calculated from the extremely variable nutrient data used for the mean concentrations. The concluding remarks should summarize the most important new findings. However, they mostly support only our present knowledge. The future perspectives are also mainly citations of other publications but are not based on the results of this study. You may also mention the coastal nutrient input which should be as high as the riverine one.

Introduction Page 13400, from line 7: This is a very simple definition of the origin of the nutrients. Rivers are partly more than 4000 km long and there are a lot of nutrient sources during the transport to the Arctic Ocean.

Minor comment Page 13400, line 4: “allochthonous” change to “allochthonous” and elsewhere in the manuscript.

Table 1: I cannot find any data by Gordeev and Kravchishina (2009) listed as reference in Table 1. There are, for example, data for DIN (mostly nitrate) and phosphate in Dittmar and Kattner (2003) but because this is a review data may originate also partly from other authors like Holmes et al. (2000). You have to be more careful in compiling data in Table 1.

Figures You are mixing SiO<sub>2</sub> and SiO<sub>4</sub> in the figures. Both are not the correct chemical formulas. The better term is silicate because there is no unequivocal formula; it exists in different chemical forms. The NO<sub>3</sub>:SRP molar flux ratio as well as other flux ratios are certainly also N:P (or Si:N) molar flux ratios and not nitrate to phosphate molar ratios.

Figures are difficult to view. They are too small. The names of the rivers (only 2 for the Alaskan rivers) at the right side of the graphs should be placed somewhere else to increase the size of the graphs. The river names can be presented once on top of the graphs.

Fig. 1-4 legends: There are sometimes only 4 Eurasian rivers, not always 7! I don't like the word "climatology" (here and throughout the ms). It is a big word just for simple concentrations. The same with "time course". This is a monthly flux estimate. No bar: no data or zero? Fig. 2: What means "month 2 to 14" for PON?? Fig. 3-5: Add g per month or year to the axis legend. I propose to add a map which shows the locations of the origin of the data used. Some locations are pretty far away from the river mouths.

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