General comments

In “Seasonal cycles of biogeochemical fluxes in the Scotia Sea, Southern Ocean: A stable isotope approach”, Belcher et al. present a study investigating the seasonal variations of organic matter (POC and PON) and biogenic silica fluxes from two sediment traps located north-West of South Georgia in the Scotia Sea (Southern Ocean). Using stable isotope approaches the authors examine the origin and some of the processes controlling the fluxes they have observed in the traps.

They investigated the differences between two productive events (in February 2018 – summer season – and December 2018 – spring season) and the coupling of C, N and Si fluxes during these events. Their main results are: Particulate fluxes and isotopic compositions were similar in the deep and shallow trap suggesting that most of the remineralization occurred in the upper layer of the water column. Despite a very noisy d15N signal, the synchronicity if the d30Si and d13C signals highlight the coupling between these two elements and the significant role of diatoms in the export of C (and BSi) in the area. Based on the estimation of isotopic baselines associated with the two productive events, they also suggested a change in the source region of the material coming into the sediment traps.

Having reviewed the first version of this manuscript, I greatly appreciate authors’ efforts to improve the reading by carefully re-organizing the different sections. The introduction is clear and describes all the background needed to fully appreciate the manuscript. New elements have been added to the discussion and greatly improve the manuscript. Some minor points will still benefit to be clarified and, although they have already greatly improved the figure, I am personally not convinced that figure 3, which is the most important figure in the manuscript, is not presented in the clearest/smartest possible way (but this is my personal taste, the data are currently there).

I detail these points below and, although I recommend publication of the manuscript after minor revisions, I am convinced that this paper will be a great addition to “Biogeosciences”.

Methods

* L238: Pioneer ref is Cardinal et al. 2003
* L249-253: A 0.12‰ offset in $\delta^{30}Si$ value might be an order of magnitude lower compared to the seasonal signal, however it is significant regarding the magnitude of $\delta^{30}Si$ variations measured in the study (and could potentially be higher than the error calculated on duplicates or using standards). I am aware that this offset is the wort case scenario, and I am convinced about the quality of the isotopic measurements and the assessment of the error and potential bias in this study. However, I think that few sentences explaining why contamination by lithogenic material has the potential to bias the signal, and most importantly why this potential contamination is unlikely, or small, in this study is missing here. Is there any data from other studies that could support the fact that LSi is not a problem here?

Results

* Figure 2: Just an idea like this… adding a dark horizontal bar along the x axis to visualize the sampling period by the sediment trap.
* Figure 3: As I mentioned earlier, I am still not convinced that using the min/max this is the smartest way to present the isotope values, especially when refereeing only to the mean value in the text. I actually had to manually draw a line going through what should be the mean value for all the $\delta^{13}C$, $\delta^{15}N$ and $\delta^{30}Si$ panels to be able to properly follow authors' discussion (see picture below). I personally think that, as it is, the figure kind of work but does not easily help supporting the text and that it will greatly benefit by plotting one symbol for the mean value (as this is the one authors used in the discussion) and perhaps a vertical line representing the range between the min and max (if authors want to keep this information on the figure).

L361: "flux-weighted" sounds odd, perhaps use "integrated"

Table 1: Having an additional line with winter values will be useful as authors mention these winter values in the text.

L383: "[…] were globally/more or less similar […]"

L388-391: I don't see quite steady isotopic values in winter in the shallow trap. They vary from 1‰ to 1.5‰ which is a significant variation when considering $\delta^{30}Si$ values.

L410: Since Dictyocha is not a diatom, do we have an idea of the range of $\delta^{30}Si$ of these organisms and how they could potentially affect (or not) the isotopic signal measured in the traps?

Discussion

* L436-439: This could be more elaborated even briefly. For example, what kind of source? what are the different degradation states and how do they affect the $\delta^{15}N$ signal in the particles?
* L467: please change "algal" by "phytoplankton"
* L474-476: If it is only "broadly similar trends", and regarding the R2, I would not use "close coupling of carbon and silicon cycling processes."
* L508: Please remove "with no significant difference between deep and shallow" as deep trap data seem more variable compared to shallow trap data.
* L520: I would not qualify this as a slight increase (it just increases)
* L563-566: Could it be also associated with a shift in community with for example a little bit more silicoflagellates?
* L599 and few other times later in the discussion: "flux-weighted" sounds odd, perhaps use "integrated"

Conclusion

L704-706: Without changing the sentence too much, I think this study does not really highlight how, but perhaps more "the importance of conducting a more detailed mechanistic understanding of the drivers of POC flux […]"

NB: The data were not available at the time of the review