

Interactive comment on “Phytoplankton dynamics in contrasting early stage North Atlantic spring blooms: composition, succession, and potential drivers” by C. J. Daniels et al.

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Anonymous Referee #1

We thank the reviewer for their comments and address them below.

This is a well-written manuscript that provides and interprets a comprehensive in situ dataset of phytoplankton production and species composition (including microzooplankton) from two different sites in the North Atlantic during pre-bloom conditions. These data complement and acknowledge the importance of the comparison with larger-scale satellite-derived data. The availability of the full dataset from Pangaea.de is particularly valuable (although I was not granted

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access despite being logged in to Pangaea?) to the wider scientific community and should allow the data to be used further e.g. comparison with other 'pre-bloom' datasets (cruises; time-series stations); modelling carbon fluxes, trophic cascades.

We agree with the reviewer that the dataset is valuable to the scientific community; the dataset will be open access once this manuscript is published.

The authors use and exploit a wide range of literature and explain the various theories behind the onset of the spring phytoplankton bloom well, particularly in the North Atlantic. However, I recommend the authors include and consider the net heat flux (NHF) as a trigger for the spring bloom (e.g. Smyth et al 2014 Ocean Net Heat Flux influences seasonal to interannual patterns of plankton abundance. PLoS ONE 9(6): e98709). Does the NHF explain the shifts in productivity and composition of the different size fractions in this study?

The reviewer is correct that Net Heat Flux may be involved in spring bloom initiations, and as such we have now considered it in the manuscript. However, net heat flux was negative for the majority of the times series (C. Lindemann pers. comm., Giering et al., in review) and does not explain the shifts in productivity or composition.

The authors enumerated ciliates and dinoflagellates and refer to the microzooplankton as potentially important grazers of the phytoplankton and I suggest more could be made on the importance of grazers (micro- and mesozooplankton) in controlling (or otherwise) the onset and composition of the spring bloom.

We agree with the reviewer that top down pressure through grazing may control or impact the onset and composition of the spring bloom. We have now discussed this in more detail, however we do not have measurements of grazing rates to support any statements about the control of zooplankton.

Specific comments

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Methods section 2.1: can the authors state how many times the two stations were sampled and negate the use of 'repeatedly'?

We have made explicit how many time the stations were sampled.

Methods: General suggestion that where possible state how many replicate samples were taken e.g. 13C, Chla, PIC etc

We have stated when replicate samples were collected.

Section 4.4, p115, L6: spelling mistake 'out' should be 'our'

This has been corrected.

References

Giering, S. L. C., Sanders, R., Martin, A. P., Lindemann, C., Daniels, C. J., Mayor, D. J., and St. John, M. A.: High export via small particles before the onset of the North Atlantic spring bloom, *Global Biogeochem. Cy.*, *in review*.

Interactive comment on Biogeosciences Discuss., 12, 93, 2015.