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Interactive comment on “Seasonal variation in marine C:N:P stoichiometry: can the composition of seston explain stable Redfield ratios?” by H. Frigstad et al.

H. Frigstad et al.

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Dear reviewer,

thank you for taking the time to read our manuscript, and for providing constructive comments and corrections that will help us in the revision process.

Specific comments:

You state that: “they use statistical relationships between Chla and POC or biovolume and phytoplankton carbon to derive the contribution of autotrophs to total POC, PON and POP concentration”. We wish to clarify this point. It is correct that we use a GLM

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regression of POC on Chla to derive the contribution of live autotrophs to the total POC concentration. However, Chla is not included in the second estimate of phytoplankton contribution, in which we use estimates of phytoplankton carbon from microscopic counts and biovolume conversions. Thus it is only the regression model estimate that is based on the simplifying assumption of constant POC - Chla relationship. Also the latter estimate of autotrophic contribution build on some assumptions, but by using two independent estimates of autotrophic contribution to total seston, and comparing these, we provide the best test of validity in our method as is possible with the data we have available. We do acknowledge and discuss the limitations of using the regression model, however despite these considerable challenges, the two estimates we provide of autotrophic contribution to total seston agree quite well (i.e. Fig 8).

You express concerns about deriving the ratios of autotrophic and non-autotrophic fractions, as shown in Figs. 10 and 11, and discussed in section 4.5. We acknowledge the potential pitfalls with the interpretation of these figures, and thus, we only discuss the general trends in the autotrophic and non-autotrophic ratios (see section 4.5 line 15-23). However we will clarify this choice, and emphasize the uncertainty inherent in these estimates in the revision. We nevertheless feel confident that the general conclusions and implications of these (as discussed in sections 4.5 to 4.7) stands firm and is highly relevant for the interpretation of sestonic elemental ratios.

We agree that including some short consideration of factors affecting seston composition in coastal vs. the open ocean would be beneficial. Our results are based on observations from the coastal ocean, however they point in the same direction as the work by Marañón (2005) obtained in the oligotrophic ocean (Atlantic subtropical gyres) and with a different approach. Namely that Redfield seston ratios do not necessarily imply a high contribution from phytoplankton under nutrient replete growth, and that seston C:N ratios is not a unambiguous indicator of phytoplankton physiological state.

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