The authors describe a mesocosm experiment designed to show the effect of increased water temperature on the biogeochemistry of a pelagic planktonic community to elevated temperatures simulating realistic expectations for global climate change. The experiment was based on three sets of triplicate 600-l mesocosms that were subjected to approximately ambient (13.5 °C) and ambient +/- 4 °C shifts. Partitioning of carbon and nitrogen between dissolved and particulate pools was monitored for approximately a month. Modest nutrient additions at the onset of the experiment resulted in a c. 12-day increase in particulate C and N, although the added nutrients were drawn down in c. 8 days. After c. Day 12, particulate C and N declined while DOC and DON increased. The trajectories of change were temperature-dependent, with the highest TOC accumulation occurring at the highest temperatures applied. This is in contrast to previous similar experiments, conducted with different assemblages and at lower temperatures, from which the authors argue for increasing uncertainty in the potential responses to global warming.

The scenario that the authors describe to account for the changes in particulate and dissolved pools is consistent with the literature. Although there are no measurements of carbon accumulation and exudation, the authors make a reasonable argument for increased formation of TEP being a causative factor. Nutrient addition and turbulence enhance formation of TEP (see Pedrotti et al., 2010, Mar. Ecol. Prog. Ser. 419: 57-69), and enhanced production of extracellular polysaccharides under conditions of sink limitation –enhanced Calvin Cycle activity at high irradiance or nutrient-limited growth – is well documented in diatoms, albeit predominantly in benthic forms.

Excess production of storage carbohydrates and lipids, which would also raise C:N, is also ubiquitous under nutrient (N, P, Fe) starvation and/or light-saturating conditions where the rate of carbon assimilation is greater than the rate of nitrogen assimilation. Nutrient starvation is a given in the experiment, although the limiting nutrient can't be identified. It seems likely that the experimental irradiance was super-saturating as well. The figure given for peak irradiance, 690 W m^{-2} (Line 101-106), would be c. 3000 μmol photons m^{-2} s^{-1} for most 'white' light sources. Full sunlight, modeled for Kiel under clear-sky conditions at noon on July 1 (Gregg and Carder, 1990, Limnol. Oceanogr. 35: 1657-1675) is c. 1830 μmol photons m^{-2} s^{-1}, so the experimental irradiance is improbably high. The dimensions of the mesocosms aren't given but if they were c. 1 m deep (i.e., 0.7 m in diameter), the mean irradiance in the optical path would still be well above intensities reported as growth-saturating (tabulated by MacIntyre et al., 2002, J. Phycol. 38: 17-38), even if there were no reflectance from the walls and bottom. In addition to the effects of high irradiance and nutrient starvation, C:N can increase with temperature under nutrient-replete conditions (e.g. Berges et al. 2002, Mar. Ecol. Prog. Ser. 225: 139-146). Consequently, the observed results would be expected from the synergies between all three bottom-up factors.

However, there is a major problem with such a straightforward account and that is the failure to achieve mass balance. Total N had declined by almost 25% and Total C had increased by 10-20% by the end of the experiment. The "over-consumption" of carbon is based on an incomplete N budget and requires the assumption that the C:N of the missing

fraction of Total N is comparable to the C:N of what was identified. The authors seem to rule out sedimenting material, wall-growth and trophic transfer by grazing. Unfortunately, there are also no measurements of Total P or Particulate Si. Having these would greatly facilitate interpretation of the data. If they also declined by c. 25% it would be reasonable to assume that sedimentary loss is responsible for the lack of mass balance in Total N. If not, an alternate mechanism would have to be considered. Denitrification seems unlikely. As it is, it's impossible to assess if the reasonable-seeming conclusion of the very high excess carbon accumulation at high temperature is accurate or is exaggerated by (temperature-dependent?) losses of low C:N material. Even so, there is clearly carbon accumulation in the mesocosm. In principle, this seems reasonable, although tuning the gas injection by assuming an equivalent wind velocity of 6 m s^{-1} seems extreme. Was the stirring really strong enough to simulate this level of exchange? These are issues that need to be explored in more depth in the manuscript.

The use of repeated 1-way ANOVA is inappropriate for several reasons.

1. It's a univariate test being used sequentially on related parameters that are not independent (e.g PON, TN).
2. The time-points are not independent with respect to time. For a univariate test, a repeated-measures approach is appropriate.
3. Temperature regulation was imperfect, and the differences in temperature within treatments are high relative to the differences between treatments.

Whether or not there are significant differences with temperature would best be tested with the appropriate multivariate tests. Paired ANOSIM is a multivariate analog of 2-way ANOVA (treatment x time) that would test whether there are significant differences between treatments. Cluster analysis and SIMPER would allow different phases (initial growth, nutrient-limited) to be tested to reveal which parameters are responsible for most of the differences between phases/temperature regimes.

This manuscript contains a valuable data set and makes an interesting addition to the literature on probable effects of global warming on marine communities. However, the issues of mass balance and stoichiometry of the 'missing' N need to be discussed in more depth before the authors' conclusions can be accepted at face value.

Line 91-100. What was the rate of change of temperature in the initial acclimation phase? i.e. was it rapid enough to shock?

Line 135-140. Were filters rinsed post-collection to avoid accumulation (in this case) of DOC and dissolved N in the interstitial space? Depending on their concentration in the medium and the mass of particulate material collected on the filter, their contribution ranges from negligible to a serious bias.

Line 208. "Fig. 2" for "Fig. 3".

Line 208-213. What is 'biomass'? Cell number? Biovolume? How was this determined (HPLC? Cell counts? Coulter volumes?)