Interactive comment on “Isotopic fractionation of carbon during uptake by phytoplankton across the South Atlantic subtropical convergence” by Robyn E. Tuerena et al.

Anonymous Referee #2

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This is an interesting paper looking at the variability in carbon isotope (and fractionation) of particulate organic matter (with CO2aq) in relation to phytoplankton cell size. The authors sampled subantarctic and subtropical regimes with contrasting environments and community structures to investigate mechanisms for isotopic fractionation in δ13CPOC resulting from carbon uptake and biological production in the upper ocean. The authors suggest that cell size is an important factor. Using estimates of cell size (via HPLC analyses) and calculated CO2aq, the authors suggest that smaller cells will respond less to increased CO2aq than the larger cells south of the SSTC and the wider Southern Ocean.

Query: when looking at investigating future epsilon-p did the authors consider the combined effect of increased CO2 and increased temperature in the two environments?

General point about Figures, it is very hard to deduce where measurements were taken in the profiles and also which interpolations were used to create the profiles.

Initial thoughts while starting to read the manuscripts were: ‘but what about species composition?’ This really only gets dealt with in the discussion. It would be good to see this upfront, including a small discussion about cell size on its own (so possibly discussing culture studies) actually supports what the authors conclude.

Introduction:

Second sentence: missing a bit; anthropogenic CO2 input to the atmosphere causes enhanced greenhouse gasses, which causes the oceans to warm up. It is not a direct effect.

Methods: A bit strange to see details of where the inorganic carbon isotopes where analysed, but none of the other analyses.

Results: 3.1 first para. In reference to Figure 1, what does MC stand for?

Figure 1 does not show a correlation between various variables, just cross sections.

3.2 Para 3 ‘There is no significant correlation between δ13CPOC and CO2aq or δ13CCO2 (Fig 2)’ where? Subtropical samples?

Para 4 Statement: Picoplankton were dominant in the subtropical environments. NO. This figure suggests that fmicro and fnano are dominant in all environments.

The authors claim there is a significant positive correlation between average community cell radius and δ13CPOC, with n=30. There are 47 data points in Figure 6a; in Figure 6b 4 are attributed to being coastal sites. What happened to the missing 13 data points?
Page 7: with to first sentence and reference to Figure 5: what is the average error and is the suggested difference supported by statistics?

Discussion: add some references when discussing the used of stable isotopes of organic matter as a primary means for examining food web structure and variability. Plus also to line 32-33 (nitrogen isotopes).