

Interactive comment on “**Factors influencing the
stable carbon isotopic composition of suspended
and sinking organic matter in the coastal Antarctic
sea ice environment**” *by* S. F. Henley et al.

Anonymous Referee

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The abstract summarize the scientific results and conclusions in a clear, concise, and well structured way.

The manuscript's introduction summarizes the information and the scientific question to discuss in an exact way, delivering scientific aspects that are very pertinent to the main goal of this research paper.

The structure's paper contributes to elucidate the key factors influencing surface and sinking $\delta^{13}\text{C}_{\text{POC}}$ in the Antarctic sea ice zone on a seasonal timescale, as well as their potential for preservation in marine sediments.

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In general the described methods are appropriate and relevant to the manuscript's specific objectives and are described in detail, showing the complexity of the analysis and the used instrumentation. However, it not describes the statistical analyses applied to obtained data in this investigation. These statistical analyses (correlations or regressions; multiple regressions; Model I or model II regressions; linear or non linear models) should be described and incorporated into the text. I suggest also, indicate into the text the used statistical software and/or graphics software.

I want to highlight the authors' efforts to collect and analyze the data in order to provide a detailed high resolution time- series analysis of carbon isotopes and associated biogeochemical parameters in surface waters, sea ice, sediment traps and core-top sediments at the RaTS site, Hangar Cove and Lagoon Island sampling stations.

The obtained results are shown in detail and show clearly the trends and possible relationships between the assessed parameters during the study period 2004-2005 and 2005-2006. The results are presented in a structured way: i.- Seasonal sea ice cover and productivity, ii.- Dissolved carbon dioxide and $\delta^{13}\text{C}_{\text{CO}_2}$ in surface waters and sea ice, iii.- Particulate organic carbon in surface waters and sea ice, iv.- Diatom assemblages and size classes, and v.- Sinking particulate organic carbon.

The figures are appropriate and pertinent with the presented results; however the graphics seem to concentrate a lot of information. In this sense, it might be advisable to use some summary tables (e.g.- regressions results: independent and dependent variable, intercept, slope, r^2 , p-value, etc)

The discussion of this paper is well structured, considering several and appropriate previous studies. The discussion attempts to explain the $\delta^{13}\text{C}_{\text{POC}}$ variability in surface waters and sea ice as function of $\delta^{13}\text{C}_{\text{CO}_2}$, $[\text{CO}_2(\text{aq})]$, chlorophyll concentrations and phytoplankton community dynamics, particularly diatoms assemblage

The authors of this paper demonstrate that $[\text{CO}_2(\text{aq})]$ and $\delta^{13}\text{C}_{\text{CO}_2}$ are not the primary factors controlling variations in $\delta^{13}\text{C}_{\text{POC}}$ in surface waters in the Antarctic sea

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ice environment. Instead, the authors argue that variations in surface water $\delta^{13}\text{C}_{\text{POC}}$ are driven by seasonal shifts in diatom assemblages, specifically by *P. inermis*. In general, the conclusions are appropriate to the performed work and the data analyses.

The references list is appropriate for the introduction, methods and particularly for the discussion of this paper.

In spite of some minor revisions (e.g.- statistical analyses, tables), the manuscript presents the scientific results and conclusions in a clear, concise, and well structured way with a valid scientific approach and applied methods.

I recommend this manuscript for its publication, according the purpose and scope of the journal.

Interactive comment on Biogeosciences Discuss., 8, 11041, 2011.

BGD

8, C1–C3, 2012

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