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Interactive comment on “Carbon sources in the Beaufort Sea revealed by molecular lipid biomarkers and compound specific isotope analysis” by I. Tolosa et al.

Anonymous Referee #3

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Particulate and sediment organic matter geochemistry is not my area of expertise, so the editor and authors should respond directly to other more qualified assessments of the methodology applied.

The manuscript presents novel data about the quality and sources of sedimentary organic matter in the Beaufort Sea. The data is significant in that it improves upon previous attempts to apportion sedimentary organic carbon to various sources (e.g. terrestrial, fossil and autochthonous) in a globally relevant and climate sensitive area of the Arctic Ocean.

The manuscript is generally well written and presents a large amount of data in table

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form which should be useful for cross referencing.

The title should be edited to reflect the focus upon sedimentary OM, rather than just carbon.

Abstract - the abstract could be improved by adding a couple of sentences at the end highlighting what the authors believe to be the most important advance made by this study. I recommend paraphrasing the final paragraph of the discussion. pg 13952.

The opening two sentences of the intro should be revised for clarity. Right now it reads as if thawing permafrost ice is exposing aquatic environments to sunlight.

Pg 13927: POC should be defined.

13928: 80's should be 1980's. The abbreviation for Sedimentary organic matter can be introduced here.

13937 and throughout: the reporting of depths starting at the deeper depth (e.g. 640-70 m) seems odd. Reorder unless this is recommended for sediment studies.

Also, the use of a dash to indicate "to" (i.e. 640-70 m instead of 640 to 70 m) is confusing sometimes in a paper with lots of negative numbers (i.e. the d13C data). Swap the dashes for "to" throughout.

13938: Much of these paragraphs constitutes discussion and should be moved. Para beginning line 5, the text referencing Belt et al is discussion, not results. Line 17 to 19 is discussion. Para beginning line 20 includes another reference to Belt et al that strays into discussion.

13940, line 23: the d13C values reported for C3 plants (-20 to -32) are bracketed by those for phytoplankton (-25 to -42), yet the text indicates phytoplankton values are depleted compared to C3 values. Check the values in the text or rephrase. Also, most of the time the authors report d13C values as smaller number to bigger number (e.g. -25 to -42), yet report -32 to -20 here. Reverse these values for consistency.

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C5995



First line 13942: spelling - Artic = Arctic

Line 12: Franklin bay = Bay. Check throughout.

13943, line 2: what is North Water?

Throughout where water masses are referred to capitalise - i.e. Pacific Water.

13948, line 9: the correlation indicates not only a common source, but common transport, deposition and degradation pathways.

Summary and conc: Finishing on point about sitosterol seems odd. This is quite a reductionist point compared to the statements preceding it in the summ/conc and also in the last paragraph of the discussion. If the point about sitosterol needs to be highlighted here, do so first, then summarize what the study says about SOM sources in the Beaufort Sea.

Table 1: change - "suspended particulate matter" to "suspended particulate matter (SPM)" as SPM is used in the table and not defined. TOC(mg g⁻¹) requires a space between TOC and the unit. TOC also needs to be defined in the table header or written out in full in the table. SEDIMENTS should not be capitalised: Sediments.

Table 2: format so units are under each analyte. Capitalise Depth. What is T and what are the units? Add (SPM) to the title as above.

Table 3: the depths look odd in this format (deepest to shallowest), change to shallowest to deepest in all tables. The units for measurements are provided in the table header and in the table - they should just appear in one of these. If in the table, then the should be in parentheses. Define UCM and CPI in the table header or as postscripts. These same comments apply to many of the other tables, check them all for consistency.

Table 5, 6 and others: Edit to match Table 7 header. "Concentrations of ANALYTE (ng l⁻¹) in suspended particulate material (SPM). Percentage XXX given in brackets.

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Table 13: The significant figures seem to precise. Just use 2. i.e. 31, 20, 47 etc.

Fig 1: SPM does not need defining in the title as it is not used in the figure.

Fig 3, 4, 6, 9: y units need to read ng l⁻¹ not ng/l. d13C (per mille) should read d13C (‰) as in the text. Define SPM and FA.

Fig 5, 7, 8, 10, 11, 12: Some of the depths are as deeper - shallower (e.g. 130-3 m), some shallower deeper (e.g. 135-145 m). All should be the same. Suggest shallower to deeper.

All the acronyms need to be defined in the figures as well, allowing them to be understandable in isolation (e.g. TOC, SPM, PUFA, LCMUOH).

Fig 7: what is IP25? X units do not need the 2 decimal places. Edited depths format on y axis.

Fig 10, 11, 12: all have units on top x axis in ng/ugC when it should be ng ugC⁻¹ etc. Units should also be in parentheses.

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