

List of changes:

- Changed the title and subtitles of section 2, 3.1 and 3.2.
- Changed the wording from 'conceptual model' to 'concept' as the term 'conceptual model' proved difficult as highlighted by both referees.
- Rewrote the introduction following the comments of referee 1 and 2 that the motivation of our work needed to be stronger.
- Rewrote the discussion. Now the discussion is built around an application example. Using the suggestion of referee 1, we used the concept of the biological carbon pump for this.
- Added new figure 3 for the discussion.
- Added flow syntax as suggested by referee 1.
- Added an atmosphere space as suggested by referee 2.
- Changed name of the surface remineralisation loop to surface layer remineralisation loop (SLRL) as suggested by referee 1.
- Modified table 1, table 2, table 3, figure 1 and figure 2 to ensure matching terms, complete legends and to add new spaces, names of loops and the flow syntax.
- Revised terms to ensure that all terms are used in the same way. Removed terms that seem to be misleading, e.g. explicit, and added more insightful terms, e.g. superordinate, higher-level and subordinate.
- Deleted unnecessary references to tables and figures as suggested by referee 2.
- Changed the order of section 2 to ensure a better reading and information flow.
- Modified the lagoon analogy in section 3.1 answering comments of referee 2.
- Added a methodological concept as supplement B for better understanding of the conceptualisation process.
- Rewrote the abstract as the introduction and discussion changed drastically.
- Changed all words to UK spelling.

Changes made to comments of referee 1:

Overall, while I am intrigued by the manuscript, and can envisage how its insights might be used, I cannot currently recommend it for publication. By being presented in a highly abstracted way, and by avoiding specific examples of its use, it feels as if any potentially interested users still have a mountain to climb. I do understand why the authors have made these choices for the manuscript. However, I suspect most readers will find the concept of interest, but will be dissuaded from pursuing it because it is unclear what next steps are needed to make best use of it.

We added an application example in the discussion (p.17 f).

In terms of its revision on this point, what I think would help it be more clearly relevant is its use in an example. From my own area – global-scale marine biogeochemical modelling – I could see it potentially providing a framework for identifying and, more importantly, *quantifying* major carbon flows between different models and, potentially, observations. In this way, the details of individual models could be ignored to focus instead on major pathways, including how these change across simulations of the present and future. Adapting the manuscript to include a clear instance of the use of its conceptual framework feels necessary to me.

We added an application example in the discussion (p.17 f).

In terms of its revision on this point, what I think would help it be more clearly relevant is its Table 3's presentation of the conceptual model's "language" is necessary, but it seems very clunky (see comments below); I don't know how this can be avoided, however

We added a pathway syntax and reduced content of table 3 (p.13-15).

Abstract: the manuscript would do well to make clear somewhere that ocean uptake of anthro CO₂ has little to do with the biological focus of this manuscript; the opening statement of the abstract is implying that the reverse is true

We rewrote the abstract.

Abstract: recalcitrant DOC is poorly defined at this point; this might not matter for the framework here, but the authors should note the work of Arrieta et al. (2015; <https://doi.org/10.1126/science.1258955>) on the bioavailability of low concentrations of DOC molecules

We refrain from adding complexity to the abstract, as we highlight the different concepts of what rDOC is at a later stage (e.g. p. 3 L105 f).

Abstract: regarding the absence of applications in this manuscript, one use this qualitative approach could be put to is creating a systematic structure of the ocean's carbon cycle that quantitative datasets or models can be aligned with; that would simplify both obs and models to allow simple comparisons of reservoirs and fluxes

We rewrote the abstract and used the feedback of referee 1 for the motivation in the introduction and the abstract.

Abstract: the manuscript would do well to make clear somewhere that ocean uptake of anthro CO₂ has little to do with the biological focus of this manuscript; the opening statement of the abstract is implying that the reverse is true

We rewrote the abstract (p.1).

Abstract: regarding the absence of applications in this manuscript, one use this qualitative approach could be put to is creating a systematic structure of the ocean's carbon cycle that quantitative datasets or models can be aligned with; that would simplify both obs and models to allow simple comparisons of reservoirs and fluxes

We added this motivation to our reasoning chain in the introduction and discussion, e.g. p.3 L72ff.

Pg. 1, In. 16-18: this sentence is confusing; what does "it is the first concept" mean?; models of the marine system are not always structured around e.g. export; also, the span of processes here is already covered in some models; so it's unclear why this framework is special

We deleted this part and modified our reasoning chain in the introduction.

Pg. 1, In. 18-19: point 1 is good; it's what I've identified above; point 2 is also good, although it doesn't introduce anything new on this point; models usually include all of these exit points because they have to; in Earth system models, for instance, the budgeting of C is critical, so these exits are explicitly there (and usually monitored diagnostically)

We deleted this part and modified our reasoning chain in the introduction.

Pg. 1, In. 20-21: It *needs* to be quantitative if it's to help here; being qualitative and abstracted to basic processes will reduce its usefulness

We deleted this part and modified our reasoning chain in the introduction.

Pg. 2, In. 28-29: But pathway options are already explicitly included in quantitative models; those move C between different reservoirs, and between locations in the case of 3D models; the conception and representation of the biological pump and its elevation of interior ocean CO₂ is arguably already a "general pathway"

We deleted this part and modified our reasoning chain in the introduction.

Pg. 2, In. 31: "inter alia" is a relatively uncommon latin expression; it might be better to replace with "among other things" for non-native English speakers

Agreed. Changed it, among other things (p.2 L39, p.7 L177, p.20 L411) or among others (p.12 L270).

Pg. 2, In. 31-33: bit of bracket indiscipline here

We revised the sentence reducing brackets (p.2 L38).

Pg. 2, In. 45: remineralisation is effectively the respiration of organic carbon to inorganic DIC by bacteria or other microbes; respiration more or less by definition turns organic C into inorganic CO₂

We deleted that sentence and made clear that we refer to inconsistent visualisation of respiration and its product (p.2 L50).

Pg. 2, In. 48-50: this sounds like the authors are trying to give a more holistic description of the marine carbon cycle, but it is unclear how this will be achieved

We modified our reasoning chain in the introduction.

Pg. 3, In. 59-60: this is getting a bit opaque now; also, the export arrow is necessarily thinner at depth because there is simply less material the deeper one goes - this is a simple function of material being added only at the surface

We deleted this part and modified our reasoning chain in the introduction (p.2 L45 f).

Pg. 3, In. 66-68: again, this sounds like it is merely making a case for a more holistic treatment of the C cycle, i.e. everything including the kitchen sink; noting that models, including conceptual ones, truncate the real world does not seem all that novel a point to make; and, as already noted, some models already go quite far towards including as much detail as is known

We deleted this part and modified our reasoning chain in the introduction.

Pg. 3, In. 81: what about dissolved inorganic carbon?; it's only the largest ocean reservoir

No changes made.

Pg. 3, In. 82: So ... straightaway some real-world detail is being dispensed with?; that sounds a little less than holistic

No changes made.

Pg. 3, In. 84: you might want to be very clear on what you mean by "species" here; it's obviously not "biological species", but it also appears not to be "chemical species" either; it's somewhere in between

We rephrased it to: The different foci and the limited spectrum of the pathways considered lead to concepts that complement each other through different resolutions (focusing on different processes or pools), but also promote partly overlapping sub-concepts. (p.2 L35-36).

Pg. 3, ln. 85-85: any explanation for these arbitrary size limits?

We changed it to: DOC smaller 0.2 μm and POC larger 0.2 μm (Kharbush et al. 2020) (p.4 L103-105).

Pg. 3, ln. 88: again, rDOC may not be recalcitrant at all, merely at low concentration

No changes made.

Pg. 3, ln. 88: 1.5 to 40,000 years is quite a span; again - any explanation for these arbitrary timespan limits?

We added some more information on the division provided by Hansell (2013) (p.4 L105f).

Pg. 4, ln. 91-92: you could note that very few models go to the bother of subdividing DIC into its constituent species

No changes made.

Pg. 4, ln. 99: the use of "particle" here might be confusing; in a marine context, this could mean an actual particle of marine snow

We will use the term OC compound for the parts in question (e.g. in section 2 and the first lines of section 3.1).

Pg. 4, ln. 105-109: this is a big ask; if the conceptual model is not going to be quantitative, it has to do something special qualitatively to compensate; the introduction here has not made it clear what

We revised our introduction and discussion to answer this comment.

Pg. 4, ln. 108: "a delay of consumers"?; this is opaque; I think it would make more sense if "a delay of" was deleted; however, I may be misunderstanding what "delay" means here

We changed it to spatio-temporal mismatch with consumers that favours sinking (p.4 L100).

Pg. 4, ln. 111: "bases" -> "is based"

Changed (p.4 L113).

Pg. 4, ln. 112: "non-exclusive"?; this might need a clarifying remark - suggesting that a review was non-exclusive implies that it read *all* of the literature

We changed it to: unsystematic literature review (p.4 L113).

Pg. 4, ln. 115-118: OK, this sounds good so far; obviously I'm immediately wanting to assign numbers ...

No changes made.

Pg. 4, ln. 121: "under the given hygiene conditions"?; this is a strange qualifier to add without explanation; is this an oblique reference to the ongoing pandemic?; in any case, either explain or delete

We deleted the sentence.

Pg. 4, ln. 121: "example" -> "analogy"

Changed (p. 6 L123 and L135, p.7 L161).

Pg. 5, ln. 138: "position change" is an interesting one given that this can have radically different drivers; it can be physical, biological-gravitational, biological-migrational, etc., each of which can have distinct consequences; for instance, dissolved OC moved by physics will not interact with sediments in the same way as OC sinking gravitationally; is this a problem?; by having multiple OC routes out of the surface, the diagram would suggest possibly not, but then is opaque on what these different routes cover

No changes made.

Pg. 5, ln. 150: quite; per my previous point

No changes made.

Pg. 6, ln. 167: SRL -> SLRL; per SLS?

We changed it to SLRL throughout the manuscript.

Pg. 6, ln. 167-176: this makes sense, but one has to concentrate with all the acronyms; I've two suggestions here; 1. maybe parse out the examples with in-line "equations" of flow pathways; i.e. SLS -> WCS -> SLS; 2. it feels like you need a syntax for using all of these space, process, pathway interactions - yes, you can write sentences with them, but having a consistent way of writing them might make it easier to follow what a particular example is doing

We added a flow syntax: Path segment [space] → Path segment [space] throughout the manuscript and in the figures and tables.

Figure 1: as already noted, the significance ascribed here to rDOC formation is perhaps misplaced given that rDOC might only be recalcitrant because individual chemical constituents are at low concentration; the predominance of this process in this model seems disproportionate given that potentially more quantitatively important processes are downgraded and lumped into "OC remineralisation"

No changes made.

Pg. 14-16, Table 3: while this table tries to address a point I made earlier about allowing a consistent description of the pathways, the result seems very clunky to me; I can't immediately envisage a clear alternative, to be fair

We adapted table 3 mostly following the comments of referee 2.

Pg. 14-16, Table 3: might a good example "process" for the breakdown illustrated here be the biological pump itself?; by looking at this, the authors could (a) give an example of how conventional understanding of a carbon cycle process can be translated into their conceptual model, and (b) illustrate the difficulties of doing so because of the associated complexity, and (c) thus emphasise the importance of a holistic viewpoint

We did not incorporate the example of the biological carbon pump in table 3 but centred our discussion around that example.

Pg. 17, ln. 298: most existing models already incorporate this cyclic aspect; what's special here?

We deleted that concrete sentence and rewrote the discussion.

Pg. 17, ln. 299-301: this sentence may describe how the process of export is *sometimes* described, but I think it's an exaggeration to suggest that this is "normal"; most modelling scientists are well aware of return pathways; to be honest, return pathways can even be highly visible at the surface, e.g. CO₂ outgassing along the equatorial Pacific

We rewrote the discussion.

Pg. 18, ln. 342-345: where this conceptual model seems useful to me is in pointing to fluxes, and making it clear where they sit in a wider consideration of the cyclic pathways of carbon

We added this feedback to our motivation and new reasoning chain.

Pg. 17, ln. 301-303: being (as the authors keep stressing) purely qualitative, the conceptual model under discussion here cannot really help with this point much more than making it clear (which may, as already noted, be obvious for many researchers) that "what goes down must come up"

We rewrote the discussion and do not stress the qualitative character of our concept anymore.

Changes made to comments of referee 1:

**For the following comments, please consider that coming from a numerical model community, the word 'model' is generally associated with equations and numerical output in my mind. While the term 'model' can be used for many purposes to define a representation of reality, I suggest that you should present a 'visual-model' in opposition to 'numerical-model', to avoid to any other biased modeler as me to look for equations and numerical outputs **

We changed the wording to "concept" throughout the manuscript.

Title: While publishing in 'Ocean science', the term 'marine' can appear in the title. Following the first referee's comment, I suggest putting the table directly with the information about your work 'a visual-model for mapping...'

We changed the title to: There and back again, a journey of many pathways: conceptualising the marine organic carbon cycle

Abstract:

p1.Ln 3 : 'other related tasks' sound vague, so I suggest removing it.

p1.Ln 3 : you may use 'cycle' instead of 'pathways', as in the line right after you are adding 'processes and pathways' ?

p1.Ln 3 : 'qualitative-visual' model can be mentioned instead of qualitative model only.

We rewrote the entire abstract.

The first paragraph (p1 Ln15 to 21) is difficult to follow without the table placed. I suggest starting with your current second paragraph (p2.Ln22 to 29) and eventually move/rewrite this first paragraph with the last ones of the introduction where you talk about your work.

We rewrote the introduction and started with a more general paragraph on organic carbon pathways (p 1 first paragraph).

p2.Ln22: Instead of 'marine ecosystems and the OC cycle', can it be reduced to 'marine OC cycle' directly ?

We shifted that paragraph into the discussion and reduced it to 'OC cycle' (p20 L418).

p2.Ln22 to 24 : Why do you focus only on particles on the surface ? You can generalize as 'An OC particle in the ocean can end up ...'

We keep the spatial restriction here (p20 L418), as we have specified that all the pathways we consider start in the surface waters.

p2.Ln23 to 24 : I suggest to re-write to have only one sentence, e.g. ' Each pathways is unique in its sequence of processes, and there is a myriad of them' . As there are a myriad of pathways AND processes.

We rewrote and shifted this part: Each OC compound travels its pathway through the OC cycle. An OC compound in the surface ocean may end up on the surface or in the deep sea, be decomposed, or become recalcitrant, to name just a few possibilities. Each pathway is unique in its sequence of processes. So, there is a multitude of possible pathways. (p20 L417-420).

p2.Ln36 : I suggest to add 'vertical export flux' instead of only 'export flux'

We deleted this part of the introduction.

In these two paragraphs (p2.Ln22 to Ln 37) some link to the feedbacks/conclusions made through those existing tools with the climate can be made, to reinforce the use of this visual-model for further use.

We shifted some of the paragraph (p2 L22-29 to p20 L417-420) and deleted paragraph p2 L29-37.

Ln39-40: I suggest to temper what it is mentioned by providing generalities such as ' ..this destination is mainly considered by changing the particles' **properties (e.g. density, shape)**'. In this case some additional references may be required.

We deleted this section.

p2.Ln40-42: I would be glad if you have in hand a reference to add, that points out these facts.

We have added examples of the described small inconsistencies in visual representations of the pathways and inserted the whole paragraph into the new chain of reasoning (p.2 L47-57).

p3.Ln82 : I do not see the point to add the notion of coral reef here.

We deleted it.

p3.Ln84 : I would have been glad to have already the information that table 1 will provide me with the dictionary of the nomenclature used in the following part. I suggest adding a sentence letting the reader know about Table 1 before moving to the explanation, as the sentence in p2. Ln84 does not sound clear to me.

We have added an insertion: Given that we conceptualise only the OC pathways (for a definition of relevant terms of the concept, see Table 1), we do not resolve carbonate and alkalinity interactions, and do not display marine carbonate systems within our concept (p2 L84).

p3.Ln85 : ' (POC) **embedding** living and non-living OC **particles**'

We changed the sentence as suggested (see p4 L103).

p3.Ln85 : Thank you for the correction made following Referee's 1 comment regarding the size mentioned/used.

No changes made.

p4.Ln.121: 'under the given hygiene conditions'; as we are already in an analogy, barely used in scientific writing, I suggest to restrain the other reference to current society behavior, as in a number of years when people will refer to this manuscript they may not be able to understand the reference to the current pandemic situation as easily as us today. I suggest deleting the allusion.

We deleted the sentence.

p5.Ln127-151 : Be sure that the words used here are consistent with the eventual reswamp of the nomenclature (see my comments below about table 1). This paragraph is really hard to follow even if I greatly appreciate the effort to place a nice analogy for explanation.

We have rewritten the section (p. 6-7). We have also adapted Table 1 (p. 5) to make it more accessible and added a methodological diagram as a supplement.

p7.Ln154 : The repetition of 'spatial, spaces, spatially' can be avoided (e.g. ' By defining four spatially bounded volumes with...').

We changed the wording: Hence, pathway patterns cannot be unambiguously defined without spatial information. To systematically add this information, we define five spaces, volumes with distinctly different environmental conditions and processes (p.7 L172).

p7.Ln155 : the reference to Table 1 is not informative and necessary.

We deleted it.

p7.Ln163-164 : I am curious why these specific systems must be represented with these specific numbers of spaces ? Is it to be sure to consider the processes/pathways in these specific systems ? As there are no 'numerical' rules for the conceptual model here, I am wondering why this information is here.

We have added that this rule applies in the case that all closed loops are resolved (p.7 L182).

p7.Ln154-164 : I am wondering why the Atmosphere is not considered here as the LSS is ?

We added an atmosphere space (AS).

p10.Ln209 : It is confusing that 'pathway patterns' means closed loops. Why not use closed loops directly ?

We have rewritten the first two sentences of this paragraph (p.10 L235).

p17.Ln311 : Not only fish and mammals, but also reptiles (e.g. McClain CR, Nunnally C, Dixon R, Rouse GW, Benfield M (2019) Alligators in the abyss: The first experimental reptilian food fall in the deep ocean. PLoS ONE 14(12): e0225345. <https://doi.org/10.1371/journal.pone.0225345>)

We have added the study to the relevant paragraph (p.19 L399).

p18.Ln334 : 'biological**carbon**pump'

We changed it throughout the paper.

For Initial position I do not get the meaning of 'Abstract' in the definition. Would 'Start position' will suffice ?

We keep "abstract" because we also mention on page 3 L83 that loops have no initial point, and that the choice of such a starting point is thus abstract.

In the example part, I suggest putting in bold the terms to have an easier reading but to not use the example of the term defined above. It is confusing to have in the example of one term and example of the term above. One should be able to see the example only jumping from one line to another in the example column.

We have adjusted the definitions and added three concrete pathways at the beginning to additionally show how we got from concrete process-based pathways to our abstract definitions of pathway patterns (p.5). We also added a flowchart of the methodology as a supplement B.

Process: In the example column you can add 'fish respiration'

We have adapted Table 1, taking into account the reviewers' criticism of the example column and the problems in distinguishing the terms.

Path segment: In the example column, you can delete the 'Processes line example', remove the 'path segment' and keep only 'OC remineralization (...)'.
See comments above.

Pathway: In the example column, I do not get why OC remineralization (presented above as Path segments) is now considered as a 'sequence of path segments'. Are the pathways defined as 1) how the carbon moves from one 'box' to another along processes, or 2) how the carbon moves in the conceptual space volumes?

We adapted table 1.

Space: This is not necessary for me to be defined here.

We keep this definition here, as the table should provide all relevant information.

Closed loop/Open loop: To the current state I unfortunately do not get clearly the distinction between pathway or loop. There is no need for two pathway examples here, it leads to confusion between pathway and loop. You can stick only with 'surface remineralization loop'.

We adapted table 1.

Process option: While I get that you want to define all the process options that we know, I suggest that the options should be already included in the 'conceptual' processes. By itself each process option is a process.

We agree and changed it to processes throughout the manuscript.

Pathway pattern: Similarly I get confused with the distinction.

We adapted table 1, added a methodological concept figure as supplement B and revised section 3.1.

Other proposition: To help the reading between the text of the manuscript and the table, you can refer as example to the same example available in the text such as for Path segment (mention the six critical path segment of the OC cycle (p5.Ln37-39)) ; for Open loop (mention the five ones (p7.Ln165)) ; and for Close loop (mention the 3 ones (p9.Ln202-206)).

We adapted table 1 with three example pathways that are part of the defined closed and open loops.

To help to connect with the text, Is it possible to have a specific code in the legend and the figure for the loops and one for the path segments?

Following referee 1, we added a flow syntax to the publication where helpful and necessary. In the figures, path segments are indicated by arrows, critical path segments by capital letters and loops by a colour code. We added this information where it was missing.

The atmosphere term should be appearing as the long-term sediment one is appearing.

True, we added it (first introduced p.7 L181)

For the nomenclature see one of the last comment made below for the link between Table 3 and Fig2.

We eliminated inconsistencies between section 2, table 3 and figure 2.

I suggest deleting the repetition of the column name each time we are moving to another path segment and therefore place the column name as the first line before the first path Organic Carbon position change (A).

The suggestions did not help the flow, so we kept the original structure.

I suggest to either place in the center the name of the path to cut the reading among the table each time the path changes, and/or use a double line before and after the name of the path, similarly to help the eyes to see that we are moving to another path.

We added spaces and double-lines to allow a more structured reading of table 3.

On the part of the table in p16, I do not see why we have again the path C, and why the path E is reduced only as a name in the first column? I guess it is a typo and the following processes refer to path E following the infos available in Figure 2.

We modified table 3 eliminating inconsistencies and adding missing path segments.

I suggest removing the column Process description as it is already well explained in the text and in figure 2, as well as the column Involved organisms. It will save space and help the reading. If you want to keep one among the two I suggest keeping the process description one.

No changes made.

However, an effort can be made to smooth again the nomenclature used between Figure 2 and Table 3 First column, to allow the reader to proceed to an easy retrieval of the processes (description or representation) between the Figure 2 and the Table 3.

We eliminated inconsistencies between section 2, table 3 and figure 2.

Organic Carbon Position Change: Following Fig.2 it seems that the biotic direct transport is not writing in the process column while infos related to seem appearing in the other columns (?)

We added direct biota-induced transport (p.13).

OC Remineralization (D): Following Fig.2 it seems that the DOC consumer respiration is not writing in the process column

We added DOC consumer respiration (p. 14).

Editorial/Typo comments :

p2.Ln49 : 'DOC' acronym has not been defined yet.

The DOC acronym is now defined before the acronym is used (p.4 L104). Mentions of dissolved OC before are written out.

p2.Ln52 : As defined in the p2. Ln49, you can use the acronym

Part is now on page 2 line 32 and not defined before.

p3.Ln60 : Extra parenthesis

p3.Ln60 : Part is deleted.

p3.Ln65 : Missing parenthesis

p3.Ln65 : Part is deleted.

p5.Ln126 : Missing a dot at the end of the sentence

Full stop is added (p.6 L132)

p7.Ln167-176 + other parts in the text : To help the reading of acronyms, can you think about having the related space ones (SLS,WCS,USS) in italic and the one related to the loop in normal?

We highlighted acronyms in italic when we mention them for the first time.

p10 to 13 : 1) Can we have subtitles for each path segment you are talking about ? Like it is done clearly in Fig.2 (Path segment A, Path segment B, etc.) ? 2) Can we have just one sentence at the beginning referring to Figure 2 and Table 3 for this entire part, instead of having it mentioned everywhere ? It will make the text easier to read.

We do not add subtitles to not disturb the text flow but table 3 is the structured summary of the text.

We referred to table 3 and figure 3 in the beginning of the section and reduced the references in the following text.

p11.Ln253 : Extra parenthesis

Extra parenthesis is deleted (p.15 L283).

p18.Ln336 : 'e.g.' before via

We deleted this part.

References:

Arrieta, Jesús M.; Mayol, Eva; Hansman, Roberta L.; Herndl, Gerhard J.; Dittmar, Thorsten; Duarte, Carlos M. (2015): Ocean chemistry. Dilution limits dissolved organic carbon utilization in the deep ocean. In *Science* (New York, N.Y.) 348 (6232), pp. 331–333. DOI: 10.1126/science.1258955.

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Hansell, Dennis; Carlson, Craig; Repeta, Daniel; Schlitzer, Reiner (2009): Dissolved Organic Matter in the Ocean: A Controversy Stimulates New Insights. In *oceanog* 22 (4), pp. 202–211. DOI: 10.5670/oceanog.2009.109.

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Jiao, Nianzhi; Herndl, Gerhard J.; Hansell, Dennis A.; Benner, Ronald; Kattner, Gerhard; Wilhelm, Steven W. et al. (2010): Microbial production of recalcitrant dissolved organic matter: long-term carbon storage in the global ocean. In *Nature reviews. Microbiology* 8 (8), pp. 593–599. DOI: 10.1038/nrmicro2386.

Kharbush, Jenan J.; Close, Hilary G.; van Mooy, Benjamin A. S.; Arnosti, Carol; Smittenberg, Rienk H.; Le Moigne, Frédéric A. C. et al. (2020): Particulate Organic Carbon Deconstructed: Molecular and Chemical Composition of Particulate Organic Carbon in the Ocean. In *Front. Mar. Sci.* 7, p. 518. DOI: 10.3389/fmars.2020.00518.

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