

Responses to referees' comments

We thank the reviewers for their useful comments and have revised the manuscripts accordingly. Below are details.

Responses to referees #1

1. Comments: Abstract line 5: 'relative concept' what do you mean here?? I guess best would be to delete 'relative' here

Response: Revised as suggested

2. Comments: Introduction: page 3, line 2: you state that the ocean absorbs about one third of the CO₂ produced by fossil fuel burning. According to the IPCC report it is about one forth.

Response: Revised as suggested.

3. Comments: p.17, line 25: Due to high terrigenous.....

Response: Revised as suggested

4. Comments: p.20, line 22-23: what is the rationale behind that? Why should the members of the rare biosphere be responsible for generating RDOC

Response: The statement has been deleted.

5. Comments: p.20, line 31: Swan et al were dealing with mesopelagic waters not with surface waters. Hence as it is phrased now, the sentence is misleading.

Response: Have revised to avoid misleading

6. Comments: p.21, line 3: rephrase sentence: Microbial oceanographers face several challenges using....

Response: Revised as suggested

7. Comments: p.21, line 6: 'not be very similar' awkwardly phrased sentence

Response: Revised

8. Comments: p.22, line 12: 'deployment' I guess development would be a more appropriate word here

Response: It was a typo here. Revised as "employed"

9. Comments: Fig.2: All the abbreviations used in the figure should be explained in the legend.

Response: Revised as suggested.

Responses to referees #2

1. Comments: The only comment I have on the structure of the manuscript is section 6.3. The paragraph here detailing mesocosm experiments reads like a laundry list of results and should either be summarized more efficiently or the specific results moved to the appropriate place in section 5 (e.g. under OA or nutrient supply).

Response: Thanks for the comments. In the revised manuscript, we have summarized the major points and shorten this part.

2. Comments: With regards to the figures, figure 3 is not terribly useful in that the gradients radiating out from a single point compared to three separate linear gradients does not seem relevant (or at least is not addressed in the text).

Response: Revised to show the gradients more reasonably.

3. Comments: In figure 4, the left panel needs to be further described in the caption to include the arrow shown in the top graph as well as the color change from black to red for the lines.

Response: Revised as suggested.

There are several minor edits to the text as written that I would recommend:

- pg 3, line 28 - change numerical to numerous
- pg 4, line 23 - insert of ("... identify the challenges of and devise strategies for ..."

- pg 6, line 10 - FT-ICR-MS is already defined earlier in the paragraph
- pg 8, line 9 - hyphenate concentration and constrained (“concentration-constrained”)
- pg 9, line 11 - insert an (“... favored an intensive anaerobic MCP ...”
- pg 10, line 14 - insert comma (“... to a reservoir, e.g. the ocean, ...”
- pg 11, line 2 - use consistent form for units (PgC year-1 and PgC/yr both used in same sentence)
- pg 11, line 3 - hyphenate RDOC-based and POC-based
- pg 12, line 1 - hyphenate “RDOC-coated”
- pg 13, line 11 - remove on (“... will in turn impact the export of POC”)
- pg 15, line 18 - insert be (“... and thus be of poor food quality...”)
- pg 18, line 12 - hyphenate climate-derived
- pg 18, line 24 - hyphenate DOC-derived
- pg 15, line 15 - reference Ingalls et al., 2006 in PNAS
- pg 22, line 22 - should define SLDOC in the text either here or back on pg 5
- pg 23, lines 10-15 - excessive use of “such” in these sentences, reword if possible
- pg 26, line 6 - hyphenate RDOC-coated

Response: Revised as suggested.