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Interactive comment on “Carbon isotopic evidence for microbial control of carbon supply to Orca Basin at the brine-seawater interface” by S. R. Shah et al.

Anonymous Referee #1

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General Comments The paper presented by Shah et al. is of excellent quality with robust data that is presented and discussed in a well-structured manner. The conclusions of the paper are clearly articulated, but I am left wondering what the significance of the work is. I am confident that it is significant, especially as little is known about carbon cycling in these brine systems, but I believe the paper would benefit from a short discussion, possibly presented in the introduction, about why it is important to understand carbon cycling in the Orca Basin brine. Following this, an additional sentence or two in the conclusions regarding the greater implications of the study’s findings would help to emphasize the significance of this work.

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Specific Comments Page 17916 - Line 9: Rather than state the conclusion so early in the manuscript, perhaps this sentence could be rewritten and used to pose the driving hypothesis of the research that has been performed. Pg 17926 Line 17: I am curious how likely it is that refractory deep-ocean DOC would be a source of the brine DOC considering they are isotopically distinct. I recognize that the difference in isotopic composition could arise from the brine DOC being comprised of a mixture of sources (as described), but it is unclear why it is likely that one of these would be refractory deep-ocean DOC. Is it just that all DOC sources are being considered? The other sources mentioned seem more plausible and I think this sentence could be reworded to make the discussion of this clearer. It may be that the use of the word “likely” is the confusing factor here. Pg 17927 Further investigations suggested are vague. Would more isotopic studies be useful or microbial studies, and why is it important to understand dissolved carbon storage in the Orca Basin brine beyond what has been presented?

Technical Corrections Page 17914 - Line 17-19, Beginning, “Future investigations . . .” Not sure that this sentence is appropriate here. Page 17915 - Line 7, change to “. . . and the composition of the . . .” Page 17916 - Line 1: It would be clearer if the first sentence on this page could be reordered and instead began with the information about microbial activity, which would be in direct contrast to the previous sentence regarding a lack of microbial activity within the brine pool. Then the chemical composition and particle trap nature of the interface could be described to explain this microbial activity. Page 17936 The keys in the bottom right of Fig 2 is confusing. Please remove.

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