

Bukaveckas Response to Reviewer #2 Comments

Reviewer #2 General Comments

The paper discussed Sources and transformation of C to understand external (river inputs & tidal exchange) vs. internal (metabolism) in upper segments of the James, Pamunkey and Mattaponi Estuaries. The contrast in the qualitative and quantitative capacities of different carbon pools in the three studied estuaries, despite that they flow adjacent to each other and share almost similar carbon sources in their catchment, is unique and essential considering the modified carbon cycle under changing global climate condition. The manuscript provides new insight to the modified carbon cycling along the tidal freshwater regions of selected tributaries of Chesapeake Bay, is well-written and the data quality is good. I think the readers of this journal will benefit from the information contained in this paper. I therefore recommend publication of the paper after minor revision listed below.

Author's Response: thank you for your comments.

Reviewer #2 Specific Comments

Introduction: The relative fraction of area covered under each estuaries during the study is not clear, whether it represent the entire estuarine contribution?

Author's Response. Text revised to clarify this point: "The study reach within the James Estuary is the tidal fresh segment, which extends 88 km from the Fall Line (Richmond, VA) to the confluence with the Chickahominy River, and accounts for ~50% of the length of the estuary. Study reaches for the Pamunkey and Mattaponi Estuaries encompassed the tidal fresh and oligohaline segments, extending 86 km to their confluence with the York Estuary."

Methods: Information on the data collection frequency and use for the model is missing.

Author's Response. Text revised to clarify this point: "Fall Line samples were collected at approximately monthly intervals, with supplemental samples collected during periods of high discharge. Approximately 200 measurements of DOC and POC were obtained at each of the gauging sites over the 10-year span (Table 1), along with continuous measurements of river discharge. For the James, the USGS data were supplemented by measuring DIC and CI at the Fall Line at 1-2 week intervals during 2012-2019 (189 samples collected)."

Summary: The relevance and global significance of the study in terms of tropical and non-tropical context.

Author's Response. I devote some attention to the global significance of tidal freshwater systems in the third paragraph of the Introduction ("Tidal freshwaters are a common feature of river-dominated estuaries throughout the world..."). For the closing point of the summary, I opted to focus on the importance of integrating mass balance, metabolism and food web studies as I felt this was a key novel aspect of the paper. I regret that I do not have specific insights to offer regarding the functioning of tropical vs. non-tropical estuaries, though I agree that this is an important research topic.