

## **Intro:**

I will defer to the authors choice on this, but the intro as is may benefit from some brief additional explanation or clarification about the intertwined nature of the two key aspects of the study, 1- the carbonate chemistry variability, and 2- the air-sea fluxes of the estuary. As written, the air-sea fluxes feel like a somewhat of an afterthought. It might benefit authors to add some point to reiterate that they are interested characterizing carbonate chemistry to for two related reasons. To me, these seem like 1) to better understand the variation in seawater pH to provide context for ocean/estuarine acidification and its impacts and 2) to better understand the variation in seawater pCO<sub>2</sub> to improve estimates of air-sea fluxes (both of which are under characterized, particularly in their region). This slight distinction might set readers up well for the rest of the paper, but nonetheless, I believe it could be sufficient as is as well.

## **Methods:**

I appreciate the changes made to this section; it looks great.

Lines 132-134 the authors write “sampling was conducted every two weeks during summer and monthly during winter”, but it is unclear to me at what frequency. The supplemental material notes that for sensor calibration purposes, this was done via replicate samples by these sensors, but some clarity on how this was done for the air-sea flux calculations would be nice in the main paper. E.g., “These discrete samples were collected by taking 1 discrete surface sample within the site every two weeks”. These details seem pertinent to have in text because you go on to calculate air-sea fluxes from these samples, so knowing the exact details is important to inform interpretation of the spatial and temporal resolution of these fluxes.

Lines 229-230, 235 (the equations): change font to be consistent with font in the paper text and with equation 1.

## **Results:**

This section has been greatly improved since the last version and is far more streamlined with the material moved to the supplement. There are a number of smaller improvements that could be made described below.

Figure 4 – only one of these plots has an x-axis labeled “season”. Formatting issues with panel letter labels (c hard to find in the y-axis label). I might move the panel labels onto the figure.

Figure 5- the x-axis label of “DATE” should be removed, as it is redundant. The y-axis labels also could be cleaned up removing the (Day-Night) label since this is redundant on each figure as well. I might suggest simply adding this to the figure caption but will defer to author/editor preference. It might also be nice to add the year (Jan-Jun) that this was conducted in the figure caption for clarity.

Figure 6 – similarly, adding the year to the top panel in the figure description might help for clarity to remind readers where this timeseries fits within the bottom two panels

## **Discussion**

In general, a great discussion, although very long (almost 10 pages). I would recommend trimming where possible but agree with the authors' overarching thoughts. I would also recommend sub-sub sections to break up the text if possible, given its overall length. For example:

### *4. Discussion*

#### *4.2 Factors controlling temporal variation in carbonate system parameters*

##### *4.2.1 Temperature*

##### *4.2.2 Biological controls*

##### *4.2.3 Tidal controls*

##### *4.2.4 Salinity*

*Etc*

*Etc*

This would be very helpful I think to keep readers from getting lost in the block of text, and allow those interested in particular aspects of the work to more quickly zero in on sections of interest.

A few additional specific recommendations below:

Lines 516-523: See my point above about methods. I feel that it is important for readers to know exactly how many discrete surface samples these air-sea fluxes were calculated from if you later make the point that there was no difference between seasonal air-sea flux estimates from single biweekly samples, and continuous sensors (an interesting finding).

Line 531: add references of studies citing challenges with k parameterization

Lines 535-540: Yes, I agree these are some of the major sources of the challenge in determining air-sea fluxes, and I appreciate the inclusion of these additional datapoints on what fluxes might be if data were treated differently.