Thank you for the review. We appreciate the time and care you put into your comments and find that they will improve the manuscript. Specific responses to the comments are given below, written in bold.

The study conducted by Granville and Berg examined air-sea gas (oxygen (O2) and carbon dioxide (CO2)) exchange in a shallow seagrass meadow in the South Bay. They compared wind speeds measured at different locations, as well as those derived from reanalysis data, which are commonly used in gas transfer velocity (k) parameterizations. They measured air-sea O2 flux using the upside-down aquatic eddy covariance (UAEC) to determine air-sea O2 flux and k. They also evaluated appropriate k parameterization in the environment. The authors applied the best-fitting k parameterization to calculate air-sea CO2 flux. They found that offshore wind measurement site and reanalysis data were similar to the wind speed at observation site. They also found significant differences in parameterized k, especially at lower wind speeds, which is often observed at nearshore regions. They also showed that air-sea CO2 flux is strongly affected by the storms.

This paper shows the concerns about using wind speed data at measured at different conditions, applying k parameterizations without considering environmental factors, and neglecting the effects of storms on biogeochemistry in seagrass meadows, with observational evidences. Since this ecosystem is playing an important role in biogeochemistry yet the existing studies are not enough, this study is important to be published.

Major comments:

Line 167:

Why is the data period so short (4 hour) for determining k? I think usual eddy covariance paper has more data than 4 hours. Since authors points out the short period of observation as a disadvantage of floating chamber in Introduction (Line 47), I assumed that UAEC can provide longer observation period. Authors mentioned that the 4-hour period on August 26 had consistently low wind speeds (≤ 4.5 m s-1). Rather than requiring the wind speed to remain consistently below this threshold, how about using all 15-min data points with wind

speeds ≤ 4.5 m s-1?

Response: You are correct that aquatic eddy covariance systems can record data for longer periods of time, including UAEC systems. The UAEC methodology in this paper for deriving kO2 follows methodology described in Berg and Pace (2017). Berg and Pace (2017) conducted proof-of-concept studies up to 40 h at multiple river sites. This study was the first time a UAEC system was deployed in a tidal coastal system and we selected the 4 hour deployment period for this study as an example because it illustrates the impact tidal current flow can have on gas exchange rates under calm wind conditions; an effect that is usually not accounted for in traditional k parameterizations.

Methods section:

I am concerned with the fact that there is no description about calculation of uncertainty in the derived k600. There is no uncertainty in figure as well (Fig. 6a). When authors try to validate parameterizations by comparing with the observed k, authors need to take the measurement uncertainty into consideration.

Response: We can include a description of how uncertainty is accounted for, and we have another figure we can add to the manuscript that shows the uncertainty in the k600 values. Also, the paper by Berg and Pace (2017) includes a lengthy discussion of uncertainty and quality control of UAEC data that we can reference to.

Line 240:

It would be better to show the wind direction as well, since authors point out that wind speed is reduced when wind blow over the land. The relationship between wind direction, measurement-site locations, and nearby land can be discussed in the Discussion section.

Response: We can include a discussion of the wind direction as well.

Minor comments:

Line 47:

I agree that floating chamber can directly measure air-sea gas flux. However, I do not think "cavity ring-down spectrometry" can measure air-sea gas flux directly. I think it can be used to measure partial pressure of a gas. Since partial pressure of a gas is combined with k to determine air-sea gas flux, this method does not measure air-sea gas flux directly.

Response: We will revise the sentence to clarify this point.

Line 52:

It would be better to explain the advantages and disadvantages of UAEC more. Can it

provide long-term measurements? Can it measure at a high temporal resolution? Is the system cheap to buy and deploy?

Response: We can add a discussion of the advantages and disadvantages of UAEC. The primary advantages are that it gives a direct measure of gas exchange at high temporal resolution and that it can be utilized at low-wind conditions where traditional k parameterizations are most uncertain. The primary disadvantages are the cost of buying and deploying an UAEC system and that it will not give representative gas exchange data at moderate to high wind conditions with bubble entrainment.

Line 54:

I think the phrase "As a result," is not needed.

Response: Will be removed, thank you.

Line 74:

Since authors already defined k as gas transfer velocity, authors do not have to write "gas transfer velocity" again.

Response: Will be removed, thank you.

Line 124:

The final station, "Hog" Island, is located..... Figure 1 caption writes it is Hog station, while Line 139 write it is Hog Island station. They should be consistent.

Response: Thank you, we will make this consistent across the document.

Line 133:

How is roughness coefficient of 0.002 m determined? If there is any citation, it should be explicitly written.

Response: A citation will been added.

Line 136 through Line 141

The instruments used to measure wind speed should be described.

Response: We will add available information about the stations and instruments for the regional stations.

Section starting Line 150:

How did the authors calculate the uncertainty in k600? The method used to calculate the uncertainty in k600 should be described in this section.

Response: The relative root mean square error was used to calculate the uncertainty in k600. We will add that into the text.

Line 173:

I think equation (3) and (4) are basically same. They should be generalized and showed as one equation.

Response: Equations (3) and (4) serve different functions in this manuscript. Equation (3) is used to convert *in situ* kO2 values derived from the upside-down aquatic eddy covariance deployment to kCO2 values so they can be compared with modeled kCO2. Equation (3) was not used for the diurnal study that derived k600 from *in situ* wind data, water depth, and current velocity, whereas equation (4) was used for converting k600 values to calculate the actual CO2 flux. We will reconsider the order of describing equation (4) in the text so that it is clear that the equations have different purposes.

Line 175:

Sc is the kinematic viscosity of water divided by the diffusion coefficient of a gas. So I am confused why solubility is involved in its calculation.

Response: Thank you for flagging this. Stating that we used solubility coefficients here was an error, and we will correct the sentence to say "diffusion coefficients", which is what were actually used for the calculation.

Line 190: It should be explicitly written that only 4 hours data was used. Currently, "during August 2021" implies that there is data for 1 month.

Response: We will revise this statement.

Line 271:

I recommend presenting the observed k first, followed by the estimated k, because the observational data are more valuable than the estimated values. Currently, the observed k are presented in Section 3.2.3. I recommend moving the relevant sentences to Section 3.2.2.

Response: We will move the relevant sentences to Section 3.2.2.

Line 310:

I thought that (Ho et al., 2011, 2016) are not appropriate citation. They might use rRMSE, but I thought they did not develop rRMSE. I think citation is not needed here.

Response: We will remove this citation.

Line 322 and elsewhere: pCO2 should be pCO2. Also, I think pco2 is not concentration. its unit is atmospheric pressure.

Response: We will make this change throughout the manuscript.

Line 337:

I thought that “mean ± standard deviation” is not needed since authors mentioned it at

Line 232.

Response: We will remove this line.

Line 377:

I think the authors do not necessarily need to cite a previous study. They can estimate the

potential bias themselves by examining how the parameterized k changes when the wind

speed is increased by 1 m s^-1.

Response: The studies that were cited used modeling tools beyond the scope of this work. We will clarify the text to explain that the intention here is to say that using a station on land requires boundary layer corrections and potential model use at all times, not just when wind is blowing from a certain direction. This correction is not needed when using a station *in situ* or a station over open water.

Line 390:

I thought that the corresponding figure should be Figure 5 and 6, not 6 and 7.

Response: Thank you, we will revise.

Line 413:

Figure 6 does not provide plot for u10>5 m s^-1, so I guess the corresponding should be

different figure. Looks like the figure number is sometimes not appropriate hereafter. Please

check them.

Response: Thank you, we will check that and revise accordingly.

Line 436:

“during peak seagrass density,” -> “during the period of peak seagrass density,”

Response: We will make this change.

Line 450:

kco2 is not only affected by wind, but also by temperature through Sc calculation. Was there

any effects from the temperature?

Response: There was a drop in temperature during the storm period, shown in Figure 7. We saw an increase in kCO2 during the storm period and an associated increase in flux; but we find that disentangling in details what the effect of the wind vs. temperature was on the kCO2

during the storm period is outside the scope of this study. We will however add to the text that the change in kCO2 during the storm period was affected by wind and possibly also some by temperature.

Table 1:

Authors need to to explicitly write that the data period was 4 hours, not "during the August 2021".

Response: We will make this change.

The parameterization of Ho et al. (2016) involves "w". Is it "v"?

Response: Yes, that was an error and we will correct it to v, thank you.

Figure1:

The two figures are not clear. Please use more high resolution map, especially the right bottom figure. Is "RPLV" in the figure "RPLV2"?

Also, I recommend adding the locations for which ERA5 data were used.

Response: Based on suggestions from the other reviewer, we will re-focus the inset map to just the region of the peninsula. We will use a more high resolution map and revise RPLV to RPLV2. ERA5 data was gridded over the full area, but we will consider ways to possibly add it to the map.

Fig. 4a:

It looks like there are small local maxima in the wind–k parameterizations, such as M04 and W09 at wind speed of 6 m s^-1, which seems unusual to me. The wind–k parameterizations are generally smooth, continuous curves without such jumps (see, for example, Figure 6 of Wanninkhof et al. (2009)). Could authors please check the figure again?

Response: We agree and have checked the figure. The error was caused by an issue with saving the figure/the figure's scaling. We will correct this.

Figure 4b:

Please specifically write what the black dots and gray lines are, in the figure caption. The figure caption writes that this figure shows "The relative standard deviation of the mean k600 value across measured U10". Therefore, I thought that the gray line is the relative standard deviation. However, relative standard deviation should not have unit, which contradict with the y axis saying "cm h^-1".

Response: The black dots are the means of the k600 values, which has that unit. The gray line is the relative standard deviation, which is unitless. We understand how this caused confusion and will clarified this in the legend.

Figure 5:

It would be better to add error bars in measurements.

Response: We will add error bars.

Also, why does the x axis range from 27 and 30 with units of Time (h)? I think time (h)

should range from 0 to 24.

Response: We will revise the axis so the hours are within the 0-24 h time period .

Figure 6a:

Looks like there is no errorbar in observed k600, so the errorbar should be added.

Response: We will add an error bar to the observed k600.

Figure 6b: The figure caption writes that "The mean and relative standard deviation of the

k600", but I am confused since relative standard deviation should not have units and y axis

says the unit is "cm h^-1"

Response: We will revise this figure caption to clarify that the intention is to use a boxplot to compare the overall results of each k600 model to one another across the deployment.