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Interactive comment on "Carbon Dioxide and Methane Emissions from Red Sea Mangrove Sediments" *by* Mallory A. Sea et al.

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We would like to thank both anonymous reviewers for their thoughts, which will greatly enhance the thoroughness and readability of our manuscript.

RC 1: Line 134 For cores S1 and S1, you need to factor in the equilibration time of the membrane equilibrator as this would affect your rate calculations (Webb 2016 L&O). By not accounting for equilibration time the flux estimates would underestimate emission rates.

AC 1: We recognize that air-water equilibrators exhibit a delay in the measured response of gas concentration and that, for some applications requiring exact CO2 concentrations at a given time, there is a need to deconvolve the CO2 or CH4 time series.

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However, our study focused on rates, calculated as the slope during a phase in which we observed a linear increase or decrease of gases for periods of 20 to 30 minutes. Convolution of the time series due to lag would not affect those rates.

RC 2: Line 46 Should be 12%

AC 2: Line 46 will be changed from 13% to 12%.

RC 3: Line 198: Using the data in Table 1, I calculate a mean CO2 flux of 1358 $\pm$ 1195 umol m-2 day-1

AC 3: It is possible that reviewer two calculated a mean CO2 flux of 1358 umol m-2 day-1 if he or she accidentally plugged in +3452 for station 1 instead of -3452 for station 1. This would create a mean CO2 flux of 1358 instead of 372.

RC 4: Line 201: You do not include the negative flux numbers in the reported range. I find the variability of the source/sink behaviour of CO2 at the different sites to be one of the most interesting findings of the paper and there is limited speculation or use of the literature to suggest why that may be. I would suggest a deeper interpretation is necessary. Factors including the disturbance if sediments during coring may be particularly relevant as crab burrows would no doubt be affected and coring through mangrove roots may disturb the entire sediment matrix.

AC 4: We report the range of CO2 fluxes observed to be -3452 to 7500 μmol CO2 m-2 d-1; it is possible that reviewer two did not see the negative sign associated with -3452 as the negative symbol appears on line 200 while the number 3452 appears on line 201. We wholeheartedly agree with the reviewer's thoughts that the high degree of flux variability is an interesting finding and will subsequently add our thoughts on this in the discussion section of our manuscript.

RC 5: Line 202 It was 5 out of the 7 sites where daytime uptake and night time production was seen.

AC 5: Line 202 was originally written to denote an overall observation, as the majority of

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sites absorbed CO2 during the day and emitted at night. We appreciate the reviewer's attention to detail and will change line 202 to "Mangrove sediments absorbed CO2 during daytime and emitted CO2 during night time at 5 out of 7 stations."

RC 6: Line 203 the units should be umol CO2 m-2 hr-1

AC 6: We apologize for this error; units will be corrected on line 203.

RC 7: Line 231 Averages and standard errors would be useful in Table 2

AC 7: In a next version of the MS we will provide range and mean $\pm$ SE.

RC 8: Line 231: Including a supplementary map of each field site would help delineate potential differences between the sites.

AC 8: While supplementary visuals would indeed aid in determining site differences, we unfortunately did not record exact core locations, but instead noted distance away from the forest edge, sampling near the center of the mangrove belt in each case. It was our hope that this would minimize spatial differences; regardless we felt the need to include the possibility of spatial variability in our discussion.

RC 9: Line 263: Fix reference

AC 9: As per the reviewer's suggestion, the referencing error on line 263 will be corrected.

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