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Biogeosciences Discussions

Interactive comment on "Spatial and temporal CO_2 exchanges measured by Eddy Correlation over a temperate intertidal flat and their relationships to net ecosystem production" *by* P. Polsenaere et al.

Anonymous Referee #1

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General comments:

With EC measurements, this paper presented spatio-temporal dynamics of vertical CO2 flux over a lagoon, and provided qualitative results of tidal effect. They found that the C flux exhibited seasonal pattern, which was related to the phenology and coverage of seagrass. They also showed that tidal flooding could easily turn the ecosystem from a C sink to a C source. However, with insufficient data points, the comparisons of different sites and different seasons were a little tricky; the discussion on the effect of seagrass coverage on the Fc-PAR relationship is not convincing. We would recommend a revision. The most serious problem of the MS is what the scientific findings are

by the authors. The MS is filled with descriptive data, lacking in targeted discussions on intertidal flat, neither on general conclusions.

Specific comments:

1. The phenology of seagrass plays an important in shaping the seasonal pattern of Fc. However, no detail description of phenology information can be found in the Materials and methods.

2. Please provide a brief introduction of the weather condition and season definition at study site, and explain why chose these study period.

3. I don't know why the authors deliberately overlooked the data collection in winter. The winter temperature in the study site is 6 C, which is not a very low temperature, assumed decomposition should happen undoubtedly. The further, as the authors have no ïňĆux data for winter conditions, the conclusion "tidal ïňĆat ecosystems are a modest contributor to the CO2 budget" (P5454, L11-12) is arbitrary.

4. The tidal activity is semi-diurnal, but how about the periodicity of spring and neap tide, did the Fc show pattern in this scale? In your analysis, you compared the Fc values in day/night and high/low tide condition, and why not try to understand the tidal effect with a time series perspective?

5. The coverage comparison seems meaningless except when compared between Station1 and Station2. For Station 1, in autumn, though with similar coverage, the average Fc differed a lot, which can't be explained by coverage. Otherwise, it would be a good example to examine the interaction effect of coverage and tidal flooding. The author can grade the coverage, and choose the day/night and high/low tide values, and then present in a chart box.

6. From the images in Fig.2 and the description about the study site, the footprint of EC seems strongly affected by tidal water. Therefore, compared to terrestrial ecosystem, the lateral mass flux in intertidal flat is very important and cannot be ignored (e.g., Yan

et al, 2008, GCB, 14: 1690–1702), and tidal activity shows significant effect on carbon flux (e.g., Guo et al, 2009, Agricultural and Forest Meteorology, 149: 1820–1828). In this MS, it seems the authors only give a superficial interpretation about the unique hydrological condition of intertidal flat. I hope the authors consider the issue more detailed and calculate the portion by tidal activity.

Technical corrections:

1. In Table 1, is this mean +- SE or SD? What's the difference between Average Fc and Daily Fc? Did you do gap-fill?

2. In Table 3, I would suggest a wind-weighted coverage for Zostera nltii.

3. Under unstable condition, the ratio of height: fetch hardly exceeded 1:100. Considering study site is intertidal flat, I would assume a strong turbulence mixing, and thus a fetch of 500m is enough. If possible, can author launch a footprint analysis and give more precise coverage values?

Interactive comment on Biogeosciences Discuss., 8, 5451, 2011.