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Interactive comment on "Ecosystem respiration in coastal tidal flats can be modelled from air temperature, plant biomass and inundation regime" *by* Xueyang Yu et al.

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The manuscript of Yu et al aims studying the ecosystem respiration in a coastal tidal flat in order to assess the effects of T°C, plant biomass and inundation regime with the purpose to model respiration in these ecosystems known to contribute significantly to the carbon cycle. For that purpose, the authors have conducted a field survey in the Liaohe Delta (China) during three consecutive years. For every field survey six plots were established and CO2 fluxes were measured as well as plant biomass in order to cover different amount of vegetation. For each plot, CO2 flux was measured in three distinct conditions, i) vegetation and soils ii) plant material alone, iii) soils without

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Discussion paper

vegetation. Additional measurements (not described in the text) were also taken when soils were inundated. The manuscript is very descriptive and suffers from several critics that preclude publication in Biogeosciences.

1/ Lack of originality. Functioning of tidal flats have received a lot of attention, and the effects of air temperature as well as the inundation regime or the plant biomass have been well studied in coastal ecosystems. In this context, it is hard to figure out what are the real advances provided by the present manuscript in the understanding of these dynamics ecosystems. Numerous studies have observed the positive influence of air temperature in regulating the functioning of these ecosystems during the period of emersion. Similarly the influence of vegetation cover on the metabolism of tidal flats has received attention these last years. Furthermore, recent works have already studied the seasonal variations of gas exchanges in these ecosystems, demonstrating the importance of air temperature in the flux dynamic.

2/ The approach proposed is not appropriate to tackle the proposed objectives. The authors have measured CO_2 fluxes during 90 seconds using a field portable gaz analyzer. From these measurements they estimate three different respiration according to three conditions, R_{eco} for all vegetation and soil, R_p for plant without soil, and R_{s+r} for soil without standing plants. This direct conversion of CO_2 measurements to respiration strongly indicates a misunderstanding of the processes involved in CO_2 fluxes in tidal flats. CO_2 fluxes represent the net balance between autotrophic processes and heterotrophic processes, therefore the measurement of CO_2 not only measure respiration but also primary production (photosynthesis). In darkness, CO_2 fluxes represent respiration but in the light CO_2 fluxes represent the balance between respiration and photosynthesis, often described as net metabolism. In the present study, the authors indicate that measurements of CO_2 were performed on field, which supposes, even so it is not mentioned, that the measurements have been performed under natural sunlight. Consequently, the CO_2 fluxes do not represent respiration but the net balance between respiration and photosynthesis. In addition, the authors do not give any information about the time of day (and consequently the light conditions) observed for each measurements. This information is not trivial because the respiration in tidal flats is strongly influenced by the light conditions, respiration can be strongly stimulated by photosynthesis activity due to the release of carbon exudates that can be rapidly used by benthic bacteria enhancing so their heterotrophic metabolism. To conclude, the authors have used a methodological approach that does not allow correctly addressing the question asked.

3/ Data presentation and interpretation. The dataset of the present study is relatively limited as it comprises few respiration measurements (4-6 measurement per year for three consecutive years) together with the vegetation biomass. Concomitantly, the authors have measured air temperature as well as other parameters which are not described. Using this small dataset, they try modeling the respiration dynamics as a function of the season considering that T°C and the water level above the sediment surface are the only factors that explain the CO2 fluxes. The description of the model is very succinct. There is no explanation about the key parameters used for the model and their dynamics (figure 8) as a function of water level (Kwt), of Julian day (Kact) and, of air T°C (Soil respiration). The description of the model is totally unclear and it is really difficult to understand how the models were designed. Furthermore, it is interesting to see that the model proposed do not correctly fit the dynamics observed in 2012; which clearly suggest that other variables have to be taken into consideration to fit as much as possible the dynamics observed.

Other remarks The data of figure 5 presenting the relationships between Rs+r and Air T°C should be used to calculate the Q10 using an Arrhenius plot. Q10 is often used to clearly determine the impact of T°C on a metabolic activity.

The data presented in Figure 6 are very confused, I would recommend to the authors to plot over time the specific activity (plant fluxes/plant biomass) which is a good indicator of the plant physiology instead of using this very confusing figure with a lot of correlation slopes which are not always significant.

The data of the figure 7 should be shown with the standard deviation in order to figure out whether the specific activity is really seasonal dependant.

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