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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.

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This is an excellent piece of research that greatly improves our knowledge of CO2 fluxes and understanding of the dynamics of CO2 in coastal zones. This is because most of previous coastal CO2 flux measurements are based on water body data. Most times they show a large CO2 degassing flux and suggest the coastal waters are "heretrophic," fueling by organic carbon (OC) from either rivers or nearby wetlands. In the Wang and Cai (2004) paper, we named this "apparent heretrophic" as the boundaries between creek/lagoon waters and marshes are not clear. In addition, due to the long residence time (or slow air-water exchange rate), CO2 produced elsewhere (also

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due to respiration) can be transported to the site. I suggest that most of the estuarine/inshore water CO2 degassing is supported by such lateral transportation of CO2 from wetlands plus in situ respiration the OC from the wetlands (Cai 2011).

This research is the one direction that I called in my recent Annu. Rev paper. Nice job and I enjoyed reading it.

I however do feel that it would be much nicer if this work is combined with water pCO2 and DIC measurements and if air-water CO2 flux and DIC export flux are synthesized together with the EC-based overall flux.

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Refs: 1. Cai, W-J. 2011. Estuarine and Coastal Ocean Carbon Paradox: CO2 Sinks or Sites of Terrestrial Carbon Incineration? Annu. Rev. Mar. Sci. 2011. 3:123-45, doi:10.1146/annurev-marine-120709-142723. 2. Cai W.-J. and Y. Wang. 1998. The chemistry, fluxes and sources of carbon dioxide in the estuarine waters of the Satilla and Altamaha Rivers, Georgia. Limnology and Oceanography, 43:657-668. 3. Wang, Z. and Cai, W.-J. 2004. Carbon dioxide degassing and inorganic carbon export from a marsh dominated estuary (the Duplin River): A marsh CO2 pump. Limnology & Oceanography, 49:341-352.

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