

Interactive comment on “Influence of seasonal monsoons on net primary production and CO₂ in subtropical Hong Kong coastal waters” by X. C. Yuan et al.

Anonymous Referee #3

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I. General Comments:

This manuscript was generally well organized and written, and the figures were of high quality. However, the methods in terms of calculations were not presented in a detailed and precise fashion in this study (See my specific comments), so that the calculated results seem to be not very convincing. I suggest that the authors should carefully deal with the calculations and thoroughly justify the uncertainties in these calculations before this manuscript can be considered for publication at Biogeosciences.

II. Specific comments:

2.1

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P5625 L1-3: “Monthly data on salinity, temperature, primary production, dark community respiration, DO, DIC and pCO₂ are found in Ho (2007) and Yuan et al. (2010)”. Does this sentence mean that all the data used in this study have been published elsewhere?

2.3

P5626 L18-19: The method in pCO₂ calculation should be given in a more detailed fashion. For instance, the pH scale and the dissociation constants of carbonic acid used in the computation should be specified. Furthermore, a careful error estimate on the calculated pCO₂ is definitely needed, since the error could be quite large based on the reported precisions in DIC and pH measurements.

P5626 L19-24: Delete these sentences, since I did not find any pCO₂ mean SST being used throughout the manuscript.

P5627 L6-12: The flux calculations of CO₂ and O₂ also need to be presented in a more detailed fashion. For instance, the formulae used in calculating the solubility of CO₂ and saturated O₂, and the wind speed data used (daily or monthly?) in parameterizing gas transfer velocity should be specified.

2.4

P5627 L12-13: The adoption of atmospheric pCO₂ of 370 μatm may be inadequate. Considering the sampling site is very close to a mega city, it is very likely subject to land mass influence as reported in many other near-shore environments (e.g. Borges and Frankignoulle 2001 and references therein). Therefore, I suggest the authors should try to find other more representative atmospheric pCO₂ data.

4.2

P5631 L15 – P5632 L14: The plots of DO saturation level vs. IPP and $\Delta p\text{CO}_2$ (the difference between surface water and air pCO₂) vs. IPP would be helpful to clearly demonstrate the relationship between O₂/CO₂ and the trophic state (net biologically

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metabolic balance). Additionally, two recent publications (Chen and Borges, 2009; Chou et al., 2009) regarding to this issue should be mentioned.

4.3

P5632 L24: Coriolis effect → Ekman transport would be a better term.

P5634 L3: The term of Rbenthic (benthic respiration) should appear in Eq. (4).

P5634 L4: oxygen input → DIC input

P5634 L5-6: Are “total ecosystem respiration” and “gross primary production” equal to “DCR” and “IPP”, respectively? If yes, please use the same terminology; if no, it should note the difference between these definitions, and explain how you got the values of “total ecosystem respiration” and “gross primary production” in your calculation.

P5634 L7: This equation is mathematically incorrect. It should be something like “ $DIC(mixing) = dDIC/dt + DIC(air-sea\ fluxes) - DIC(pelagic\ NPP) - DIC(benthic\ respiration)$ ”

Figures

P5643 Fig. 3 should be enlarged.

P5644 Indicating saturated DO concentrations on Fig. 4(A) and atmospheric pCO₂ levels on Fig. 4(B) would be helpful.

P5645 Please explain why there are 260 data points on Fig. 5. (8 (stations) x 7 (cruises) = 56?)

P5647 Please explain how to obtain all the numbers for dry and wet seasons (take average of summer and fall for wet season, and average of spring and summer for dry season? Or ...).

References

Borges, A.V., Frankignoulle, M., 2001. Short-term variations of the partial pressure of C2389

CO₂ in surface waters of the Galician upwelling system. *Progress in Oceanography* 51, 283–302.

Chen, C.T.A., Borges, A.V., 2009. Reconciling opposing views on carbon cycling in the coastal ocean: Continental shelves as sinks and near-shore ecosystems as sources of atmospheric CO₂. *Deep-Sea Res. II* 56, 578–590.

Chou, W.C., Gong, G.C., Sheu, D.D., Jen, S., Hung, C.C., Chen, C.C., 2009. Reconciling the paradox that the heterotrophic waters of the East China Sea shelf act as a significant CO₂ sink during the summertime: Evidence and implications. *Geophys. Res. Lett.* 36, L15607, doi:10.1029/2009GL038475.

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