

Interactive comment on “Air-sea CO₂ fluxes in the East China Sea based on multiple-year underway observations” by X. Guo et al.

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Response to Referee #2

Review #2

This is a very well written manuscript with a wealth of data. I read it with interest and have only minor comments:

1. It is not clear how exactly the surface water $p\text{CO}_2$ data were corrected to 2010.

[Response] The increasing rate of surface water $p\text{CO}_2$ in the East China Sea reported by Tseng et al. (2014) was $2.1 \mu\text{atm yr}^{-1}$ based on the observations in 1998-2012. We assumed that this yearly change rate was evenly distributed to each month, based on which we corrected all of the $p\text{CO}_2$ data to June 2010. Similarly, the atmospheric $p\text{CO}_2$ data were corrected to June 2010. This information has been added to the revised MS.

2. It is not clear why the authors chose to explain the low $p\text{CO}_2$ in Oct., 2006 based on the oxygen data. Why not use the chlorophyll data which is more directly related to blooms?

[Response] We agreed with the reviewer that Chl-a data would be direct evidence to show phytoplankton blooms, which are unfortunately not available. Oxygen saturation is alternatively very sensitive to demonstrate levels of biological productivity. For example, sites with blooms are often characterized by super-saturation of oxygen.

3. I think there are more data in the literature giving CO₂ fluxes in the East China Sea. A more detailed comparison is warranted.

[Response] Accepted and revised as suggested. We expanded the comparison in Section 5.2 in the revised MS.

4. It should be discussed why the ECS flux is so large.

[Response] Accepted and revised as suggested. Please also see our response to Review 1.

References

- Takahashi, T., Sutherland, S.C., Wanninkhof, R., Sweeney, C., Feely, R.A., Chipman, D.W., Hales, B., Friederich, G., Chavez, F., Sabine, C., Watson, A., Bakker, D.C.E., Schuster, U., Metzl, N., Yoshikawa-Inoue, H., Ishii, M., Midorikawa, T., Nojiri, Y., Kortzinger, A., Steinhoff, T., Hoppema, M., Olafsson, J., Arnarson, T.S., Tilbrook, B., Johannessen, T., Olsen, A., Bellerby, R., Wong, C.S., Delille, B., Bates, N.R. and de Baar, H.J.W., 2009. Climatological mean and decadal change in surface ocean $p\text{CO}_2$, and net sea-air CO_2 flux over the global oceans. *Deep-Sea Research II*, 56 (8-10): 554-577.
- Tseng, C.M., Shen, P.-Y. and Liu, K.-K., 2014. Synthesis of observed air-sea CO_2 exchange fluxes in the river-dominated East China Sea and improved estimates of annual and seasonal net mean fluxes. *Biogeosciences*, 11: 3855-3870.