

Response to editors suggested changes:

You have chosen the “result and discussion” structure for your paper

Chapter numbers and title must follow this format.

In addition, I believe your paper be easier to read if you combine actual 3.1+3.3 and 3.2+3.4, without altering the text.

This is a good suggestion and we have revised the structure of the paper as follows:

- 1 Introduction
- 2 Experimental
 - 2.1 Eddy covariance fluxes
 - 2.2 Flux footprints
 - 2.3 Seawater measurements
- 3 Results and discussion
 - 3.1 CH₄ fluxes and implied seawater concentrations
 - 3.2 CO₂ fluxes and implied seawater concentrations
 - 3.3 Spatial homogeneity of the study region
 - 3.3.1 Variability in salinity
 - 3.3.2 Variability in seawater pCO₂
 - 3.3.3 Variability in dissolved CH₄
 - 3.4 CO₂ gas transfer velocity
 - 3.4.1 Dependence of K_{CO₂,660} on wind speed and friction velocity
 - 3.4.2 Seasonal variability in K_{CO₂,660}
 - 3.4.3 Dependence of K_{CO₂,660} on bottom-driven turbulence
 - 3.5 Effects of rain on air-sea CO₂ exchange
- 4 Conclusions

L39 : change “terrestrial aquatic systems” to “continental aquatic systems” or “inland aquatic systems”

Changed to “Inland aquatic systems”

L50 “Due to both the ‘solubility pump’ and the ‘biological pump’, the surface ocean can be a net source or sink of CO₂, depending on location and time of the year” The term “pump” clearly applies for the case of a sink of atmospheric CO₂, but not for a source. Please rephrase

Revised to:

“Seawater CO₂ levels are primarily determined by solubility (temperature-dependent) and the balance between primary production and respiration by the biological community. Seasonal and geographical differences in seawater temperature and biological activity mean that the surface ocean can act as a net source or sink of CO₂, depending on location and time of the year (Khatriwala et al. 2013; Houghton 2003).”

L52 “The global open ocean is modelled to absorb”, not sure this is the appropriate formulation

Revised to:

“Models estimate that 2.4 ± 0.5 GtC yr⁻¹ of CO₂ (a quarter of anthropogenic emissions) have been absorbed by the global ocean over the last decade (Le Quéré et al. 2018).”

L83 not sure if mentioning such details on surfactants effect on K is relevant in the introduction of the present study, which does not deal with surfactants.

The section on seasonal variability in $K_{CO_2,660}$ (now Section 3.4.2) discusses this briefly and refers to Figure 13 ($K_{CO_2,660}$ colour-coded by Chl a , which is often used as an indicator of likely surfactant levels). We feel that this is a relevant-enough topic to be retained in the introduction.