

Interactive
Comment

Interactive comment on “A high-frequency atmospheric and seawater $p\text{CO}_2$ data set from 14 open ocean sites using a moored autonomous system” by A. J. Sutton et al.

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Received and published: 29 August 2014

We thank all referees for their thoughtful and constructive comments and suggestions on our manuscript “A high-frequency atmospheric and seawater $p\text{CO}_2$ data set from 14 open ocean sites using a moored autonomous system.” The revised manuscript will be much improved as a result of the careful critiques. Below we discuss the comments from Referee #2 point by point including original referee comments and our responses bulleted underneath.

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Sutton et al. present a new set of high resolution mooring data of the sea surface and atmospheric pCO₂ for the period 2004-2011 derived from a Moored Autonomous pCO₂ system. The authors have done a great job to describe (a) the measurement system, (b) the processing of the data and (c) their uncertainty estimation. The data are easy to access and I am convinced that they will be widely used within the community and this manuscript will receive many citations. I would like to recommend the manuscript for publication after a few minor comments (below) have been addressed by the authors.

Specific Comments:

Page 388, lines 12-13: “ : : scientific community identified that constraining ocean biogeochemical models would require much greater temporal and spatial resolution of field data.” - please add a reference to this statement.

– Good point. We’ve added a reference to that statement.

Page 388, lines 21-22: “This level of accuracy has allowed the scientific community to constrain regional sea-air CO₂ fluxes to 0.2 Pg C yr⁻¹” - please add a reference to this statement

– That was an oversight that all of the reviewers pointed out. We’ve added references and explanation to that statement.

Page 388, lines 25-26: “... it has not solved the problem of quantifying temporal variability at a given location” - this statement is not quite correct. E.g. Watson et al. 2009 use underway data to investigate the variability at a given location, i.e. the subtropical North Atlantic. I suggest to change “at a given location” to “at a given point in space”, to make the statement more clear.

– Thank you for the reference. We’ve modified that statement to be more specific as suggested.

Page 390, lines 19-22: “The LI-820 is calibrated before every measurement using a “zero CO₂ reference” derived by scrubbing CO₂ from air using soda lime and an ESRL

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standard gas that spans the ocean pCO₂ values where the system is deployed” - This information is repeated on page 391 lines 3-5 (where it fits better) and can be removed on page 390.

– Done.

Page 392, lines 19-20: A question out of interest: Why has the system been set so it would take a measurement every 3h and not e.g. more frequent?

– 3-hourly data allow us to constrain the daily cycle while maintaining enough battery for > 1 year deployments.

Page 393, lines 7-8: “... they have been deployed since 2011 and are not included in the finalized data set presented here” - Will they be included in the future, and – again out of interest – do you plan to update this data set on an annual, biannual, etc basis?

– Yes. We plan to submit updated mooring data publications every 3-5 years as stations, methods, or additional parameters are updated or added to the data sets (e.g., pH).

Page 411, table 4: How do you account for the uncertainty attached to measurement of the underway systems, the pCO₂ calculation from DIC and alkalinity or the globalview data?

– We do not account for the uncertainty of the measurements we use as comparison data. In this manuscript, we focus on making conservative estimates of uncertainty in the MAPCO₂ measurements.

Reference: Watson, A. J., et al. (2009), Tracking the variable North Atlantic sink for atmospheric CO₂, Science (New York, N.Y.), 326, 1391, doi: 10.1126/science.1177394

Interactive comment on Earth Syst. Sci. Data Discuss., 7, 385, 2014.

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