

Interactive comment on “New insights of $p\text{CO}_2$ variability in the tropical eastern Pacific Ocean using SMOS SSS” by C. W. Brown et al.

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Received and published: 23 April 2015

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Review New insights of $p\text{CO}_2$ variability in the tropical eastern Pacific Ocean using SMOS SSS C. W. Brown, J. Boutin, and L. Merlivat

This is a nice paper describing high resolution CO_2 flux estimates in the NE tropical Pacific based on remotely sensed SST and SSS along with low resolution $p\text{CO}_2$ data from the SOCAT database. I concur with the assessment and comments of Reviewer #1 and add some comments below.

1. There should be a more comprehensive assessment of how well the synthetic “LUT” $p\text{CO}_2$ (from SSS and SST plus look up table) compares with observations. Since the

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$p\text{CO}_2$ and remotely sensed SSS & SST observations only overlap for 2010 and 2011, some discussion need to focus on how well the static relationships used in the LUT (Figures 2 and 4) work when using [adjusted] historical $p\text{CO}_2$ data and recent SSS and SST. Also it should be noted that the DIC data are from 1995. 2. The SMOS product and uncertainty in SSS from SMOS needs to be better described particularly the fidelity of the 0.25 degree data in light of the comment running average over 100_100km² (page 4601 line 7). A comprehensive comparison along the cruise track with the 5 cruises in the 2010 and 2011 time frame is warranted. 3. The uncertainties in the fluxes need to be provided. 4. There is discussion about the effect of rainfall on $p\text{CO}_2$ but there is no mention of the effect of rainfall on the gas transfer velocity (and thus flux). In this region with high rainfall this could be significant. (see e.g. Komori et al. 2007 where the Panama basin shows a large rain induced enhancement of k : Komori, S., Takagaki, N., Saiki, R., Suzuki, N., Tanno, K., 2007. The effect of raindrops on interfacial turbulence and air-water gas transfer, in: Garbe, C.S., Handler, R.A., Jähne, B. (Eds.), Transport at the air-sea interface: measurements, models and parameterizations. Springer Berlin, pp. 169-179.) 5. As mentioned by reviewer 1. While interchanging $f\text{CO}_2$ and $p\text{CO}_2$ will likely not effect the results to any degree, it comes across as a bit sloppy mixing these parameters, and the correction is straightforward to apply. 6. The $p\text{CO}_2$ data accessed through SOCAT primarily comes from a few investigators (Nojiri, Takahashi & Feely). Acknowledging them by name in the acknowledgments (or offering co-authorship) would be appropriate. 7. I believe the region labeled the South Equatorial Current is incorrect. In the Eastern Equatorial Pacific the SEC is South of the Equator. Moreover in “Wikipedia” the SEC is defined as South of 5 N. 8. 4600 line 5: WOCE data available from <http://woceatlas.ucsd.edu/>, I do not believe the Atlas provides data. The right access point is CCHDO. 9. Figure 6 bottom panel: It would be more illustrative if the bottom panels showed the difference between SOCAT and LUT data.