

Interactive comment on “A17-year dataset of surface water fugacity of CO₂, along with calculated pH, Aragonite saturation state, and air-sea CO₂ fluxes in the Northern Caribbean Sea” by Rik Wanninkhof et al.

Anonymous Referee #2

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The manuscript presents a dataset of surface ocean fCO₂, and auxiliary variables, measured in the Caribbean from 2002-2018. In addition, a data product consisting of gridded and gap-filled maps of fCO₂, pH, aragonite saturation state, and air-sea CO₂ fluxes is produced and presented. Both the observational dataset and the data products are of undoubtedly high quality and will very likely be very useful to the global ocean carbonate chemistry community. The manuscript is nicely presented and illustrated, and overall well-written though at times highly repetitive. This work is highly relevant for publication in ESSD and can be published after minor revisions (detailed

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below).

Major comments:

Why use annual multilinear regressions? I understand from the appendix that using delta_fCO₂ did not improve the results, but I'd like to also see what difference it would make to use one multilinear regression where atmospheric xCO₂ (or fCO₂) is included as a predictor variable. Have you analyzed whether the use of annual multilinear regressions create discontinuities between December and January? Please add a figure showing that this is negligible.

I find the entire manuscript to poorly structured which results in a lot of repetition. I suggest to restructure in order to create a nicer flow of information and thus increase readability. Some suggestions, in no particular order: - The information on lines 94-104 would be better suited in section 1.3 (instrumentation) - Information in section 1.3 (instrumentation) and sections 2.1 and 2.2 should be combined and the text screened for repetitive information (e.g., the frequency of calibration is mentioned on line 114 and again on line 122) - I'm not sure of the value of section 1.3.3 unless these data are used in the presented dataset or data products (which is unclear) - Section 2 could be a subsection under section 1 - Much of the information on lines 65-74 would be more appropriate in the methods (much of it is also repeated in the different methods sections) - The information on lines 270-294 would be better suited in section 3.5 - In section 4.1 you give much information which is suitable, and partly repeated, in section 5

Minor comments:

Line 64: I'd prefer the term “raw data processing” over “data reduction”. While the former is commonly used in the community, it is not intuitive to those outside what it actually involves. In the introduction it is stated that the Explorer of the Seas changed her home port to Bayonne, NJ in 2008 while in section 1 it is stated that the new home port is Cape Liberty Cruise Port. I realize these may be in the same place but it is neverthe-

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less confusing. Please revise Line 171: Explain what flag questionable is (presumably WOCE 3) Line 242: I do not understand the method. Please explain. Line 340-341: While this is correct I find it helpful to instead state that when $\omega_{Ar} < 1$ dissolution is thermodynamically favored, and vice versa when $\omega_{Ar} > 1$. In living organisms both dissolution and precipitation of calcium carbonate is biologically mediated, and shells have been shown to survive well in water with $\omega_{Ar} \sim 0.9$. In section 4 you should define the difference between a dataset and data products. My experience is that surprisingly many do not know the difference. It is unclear whether you consider the gridded data part of the dataset or a data product.

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