

Interactive comment on “A multi-decade record of high-quality fCO₂ data in version 3 of the Surface Ocean CO₂ Atlas (SOCAT)” by Dorothee C. E. Bakker et al.

Anonymous Referee #2

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The paper by Bakker et al. presents the latest version (version 3) of the Surface Ocean CO₂ Atlas (SOCAT) and describes its improvements relative to SOCAT version 2. The new database includes a large number of additional data and extends the record from 2011 to 2014. Moreover, data quality check and documentation are improved, as well as its graphical interface. Authors also highlight the importance of such database for the carbon cycle scientific community by providing an interesting description of previous applications of SOCAT data. Additionally, they provide useful guidelines to acknowledge the work of SOCAT data providers and community.

The manuscript is well written and detailed. As a consequence, I believe that, after modest revisions that should not be hard to address, the paper should be published.

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My recommendations are given below.

Page 5, line 6: I am not familiar with LDEO database, but I am wondering why it is not merged with the SOCAT database yet and if there is any plan to do that in the future. I suggest clarifying this aspect in the manuscript.

Page 6, line 32: Please specify what WOCE stands for.

Page 7, line 16: Please clarify how the number of data with quality control flags A, B and C have been increased relative to SOCAT version 2.

Page 10, lines 17-25: It is unclear to me what the difference between the ‘recommended’ fCO₂, calculated by using the 14 algorithms listed in Table 6, and the (re-)calculated fCO₂, calculated by the SOCAT algorithms, is. I suggest reformulating the text to clarify better this crucial aspect.

Page 10, lines 29-30: Does the use of external data (e.g. atmospheric pressure from NCEP or salinity from WOA) affect the data quality flags?

Page 10, lines 30-31: Please specify which version of WOA is used to obtain salinity when in situ data are not available, as done for the NCEP version.

Page 10, line 32: Please clarify why the new Ferret script implemented in SOCAT version 3 is “an important change” relative to previous versions using a Matlab code.

Page 12, lines 30-31: I believe it is worth providing a quantification of how much “rarely” is. I would suggest providing percentages of high-quality cross-overs found in coastal waters, iced-covered regions and ROFIs.

Page 13, line 10: Please clarify why the additional guidelines in SOCAT version 3 are not systematically applied to open ocean fCO₂rec data away from sea ice.

Page 15, line 14: Please provide an example of what a property-property plot is.

Page 22, line 22: I cannot find this information in Regnier et al., 2013. I believe they

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refer to 0.1 Pg C yr⁻¹ as the increase of the lateral export of land-derived carbon, associated to anthropogenic activities, to the open ocean. Please check.

General: Some sections of the manuscript are in italic and, as mentioned by authors, indicate significant differences from the paper Bakker et al., 2014 describing SOCAT version 2. I am not sure it is necessary.

SOCAT database, including its future versions as described in this manuscript, is and will be a very useful tool for a wide scientific community. Keep up the good progress.

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