

Review of Stavert et al: *The Macquarie Island [LoFlo2G] high-precision continuous atmospheric carbon dioxide record* for AMT

November 22, 2018

The article by Stavert et al is submitted to Atmospheric Measurement Techniques (AMT). It describes retrieved CO₂ measurements with a LoFlo2 instrument from Macquarie Island, a site in the Southern Ocean and the importance of this unique dataset.

The paper gives a detailed description about the site at Macquarie Island, measurement collection routines and limitations, the instrument setup, calibration and uncertainty analysis, definition of the baseline record as well as a general climatology of the dataset.

Main comments:

1. It's probably too late now, but I would suggest that this is not so much a "technique" paper as a "data" paper, and ESSD(D) might have been a better target journal.
2. I would highlight the importance of these measurements even more in the introduction, and the potential 'gaps' these measurements could fill with references about studies that focused on the importance of Southern Ocean CO₂ measurements and their application.
3. If it is not too time consuming a paragraph about general error prorogation (with reference) and adding the difference between those and your measurement uncertainty method would be useful. More emphasis on the filtering techniques would lean the paper back towards AMT appropriate.
4. A few sections in the results could be simplified (e.g. the discussion of using minutely S.D. to filter out local influences). A careful reading to condense some of the text would be useful.
5. In terms of the uncertainties (e.g. Type 4) have you tested using the interquartile range (or the 25th and 75th percentile) as the measure of uncertainty instead of the 1 sigma, and also maybe to weight the fitting based on the uncertainty? This is more a comment and I am not suggesting to re-calculate everything but it would be interesting (maybe in some future measurement uncertainty quantification work) to see how much those changes would affect the results.

In general, the paper is nicely written, scientifically sound and worthy of publication. After addressing these and other minor comments the manuscript will be suitable for publication.

1 General Comments

- A number of abbreviations are not defined the first time they are mentioned (e.g. MQA in abstract and throughout the text, CSIRO in the introduction, WMO). Also you jump from writing the full term to abbreviations often, it would be better to have some consistency, either use the full term or the abbreviation.
- Page 2 line 12 However, efforts... → is there some additional reference for this sentence/statement?
- Page 2 line 16 subantarctic zone and polar front zone → are there any studies that explore how this affects the measurements?

2 Technical Comments

- Page 2 line 7 → The Southern Ocean abbreviation (SO) is unnecessary, it is only used in the introduction.
- Page 3 line 5-6 north-south and south east → consistency, do you need a dash or not?
- Page 13 line 1 'the figure' → specify again which figure
- Page 14 line 15 criterion . → remove the space before the dot
- Page 14 line 16 Standard deviation (SD) → you used the standard deviation before in the text so define the abbreviation before.
- Page 16 line 11 Thoning et al. → missing year
- Figure 3, could the right axis (standard deviation) be coloured to blue? Do the flask samples come with some uncertainty that could be added to the plot?