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Long-term continuous atmospheric CO₂ measurements at Baring Head, New Zealand:
Brailsford et al.

General comments:

This is an interesting and valuable paper. It is concise and to the point and will be very useful to GAW but also to the carbon research community in general. After Mauna Loa, Baring Head boasts the second-longest CO₂ record. This is probably the first extensive, fundamental description of the whole system, calibration and data management procedure being routinely implemented by NIWA at Baring Head. Not only is it important to know how all this is being done; it could also serve as a guideline to other sites where high-quality CO₂ measurements are being made.

However, the title should be slightly modified to portray more accurately the content of the paper, which focuses primarily on the analytical aspects and calibration procedures as well as data control. As it stands, the title as well as the first sentence in the abstract conveys the impression to the reader that the authors will also discuss the actual Baring Head CO₂ time series. To rectify this, the following phrase could be added to the title after “.....New Zealand: system design and calibration procedures.” Although the authors refer to a companion paper at the bottom of page 5891 dealing with the CO₂ time series (Stephens et al., 2012), this should be stated more pertinently at the beginning. Nonetheless, the authors also have an opportunity in this paper to add a very short paragraph briefly describing the time CO₂ time series (shown in Fig. 3) without stealing the lime light from the companion paper. A CO₂ growth rate graph could also be added as a secondary axis to Fig. 3, thereby providing additional value. However, the authors should decide whether they would like to do this or not.

It is noteworthy to read that the current Baring Head data quality does not yet meet the objectives set out for the WMO/GAW programme, in spite of all efforts of the experienced scientists involved. The paper fits well into the scope of the special issue of AMT. Thus the manuscript should be accepted for publication after a number of minor revisions have been made. These are specified in the specific comments listed below.

Specific comments:

The paper is very well structured and the use of the English language is generally of a very high quality. A few cases warrant attention, however:

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The hyphenation is somewhat arbitrary. There are examples where it is according the rules of English grammar, while in a several other cases similar constructions are not. A careful revision of all expressions containing hyphens is thus necessary.

Page 5892, line 6: According to the geographic information given in the introduction (page 5891, line 10) it should read "northwest" here and not "northeast".

l. 14: Replace "GAWSIS ID" with "GAW ID" (see BHD page in GAWSIS).

page 5893, line 10: Some people prefer to use the term "flow-through gas" instead of "reference gas", since "reference gas" is also used in connection with calibrations. See conflict in Fig. 2 and its caption.

Page 5893, "Air inlet system": It would be helpful if reference is made to Fig. 2 in this paragraph.

Page 5896, lines 19 and 24: "programme" / "program". There is a mixture of British and American spelling. Please check the manuscript for uniform usage.

Page 5896, lines 6 - 8:”Before to the removal.....the pump.” The sentence is not quite clear to me. Perhaps it could be re-phrased.

Page 5901, line 17: typo, remove the comma after "NOAA".

Page 5902, line 13 and page 5903, line 12 and page 5903, line 12: Replace "comparability" with "compatibility". For these terms see (e.g.) WMO/GAW Report No. 194, Table 2 (page 3 top).

Page 5902, line 26: "small" should be specified (how many ppm CO₂?)

Page 5903, line 1: A reference (one or more) should be supplied after ".....other stations"

Fig. 2: Mixed use of the term "reference gas". In the schematic: = cylinder with the flow-through gas, in the caption: = calibration gas traceable to the WMO CO₂ scale. Perhaps the Figure could be enlarged somewhat.

Fig. 3, caption: "southerly interval CO₂ time series". Please clarify the expression. It is nearly impossible to optically discern the fit from the trend. There is also still space to enlarge the graph as well. Furthermore, Fig. 3 should also have CO₂ in front of [ppm] on the Y-axis as is shown on Fig. 4 (Δ CO₂ [ppm]).

Fig. 4: legend. The font size should be increased.

Fig. 4, caption: "loess". As abbreviation of a specific smoothing technique, it should be written as "LOESS" or "Loess".