

Review of version 2:

“Atmospheric CO₂, CH₄, and CO with CRDS technique at the Izaña Global GAW station: instrumental tests, developments and first measurement results”, by Angel J. Gomez-Pelaez et al.

Over all, the authors have made a commendable effort at addressing previous reviewer comments, specifically by conducting a series of additional tests to illustrate the dependence of CO₂ measurements on the analyzer inlet pressure. Much of the work and equations have been clarified. My main additional comment is on grammar - the document has many awkwardly phrased sentences. I have pointed out some of them below, but it would benefit from a thorough grammatical edit/review for language.

Specific comments:

Section 2.3 (P4 L20 and on):

A brief one or two sentence description of this test should be given here so the reader does not have to refer to Yver Kwok. Otherwise it is not clear how this test is different from the one described in 2.4. I believe what is referred to here is keeping a constant inlet pressure and flow rate but allowing the room pressure (ambient pressure) to vary.

P4 L 25 - can the authors provide a reference as to what they are referring to here - are there certain CRDS units that have a dependence of CO on natural ambient changes? Otherwise, one could be more general, as in “our main purpose was to confirm that the CRDS unit’s CO₂, CH₄, or CO measurements are not affected by natural ambient pressure changes.”

P5 section heading is a partial sentence but has a period (grammar). I think just replacing the period with a colon (:) would work. Also first sentence grammar: “its” should be “their”, as it is describing “relationships”.

Thank you for the complete description here of choked flow. I did not know that the non-aircraft units also used a critical orifice.

P5 L28: should be “downstream of the CRDS, but upstream of the vacuum pump”.

This section is much improved, with the additional tests making a much more robust point about the influence of inlet pressure (or flow rate) on the measurement for CO₂. This finding likely has implications for other users of these analyzers if they are not controlling pressure upstream to ensure the same flow rate between sample and standards.

P12 L6-10 sentence is hard to follow

P13 eq 8,9: Wouldn’t it be easier to characterize the calibration with the CO₂ from the standards on the Y-axis and have CO₂ovc be the dependent (x) variable? Then solving the quadratic equation is not needed. Same could be said for equations 6 & 7, I would

think this is the more common format. Regardless, no need to address this, it just seems it would be easier on the computation.

P24, L9 consistence should be consistency

P24 L12: should just say water vapor correction or H₂O correction?

P25 L1-2 grammar

P32 L22: Can the authors be more quantitative here about what “good” means? The CRDS passed the acceptance tests for ICOS?

P33 L25: should read “we have determined and discussed the physical origin of...”. This occurs elsewhere in the text as well, where “physical” is used awkwardly.