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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "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.

**Anonymous Referee #2**

Received and published: 1 December 2017

In this paper, the authors present their instrumental set-up to measure greenhouse gases continuously at Izana global GAW station. The instrument performances are tested and interferences are studied. First ambient air measurements are compared against the historical NDIR and GC systems. This paper should be published after corrections as detailed below.

General comments:

The paper would benefit from an English proofing.



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Specific comments:

p4: It would be great to have a plot of the inlet pressure tests. Did you only varied between two pressures? Also, it would be good to make this test several time to see if drifts occurs over time and if the results are reproducible as you are using them to correct data.

p4: You mention using smaller inlet pressures differences, does that lead to smaller RMS residuals? Is then the inlet pressure correction useful?

p5 l25: From experience, the outletvalve value change with time, depending on the Tdas temperature, after restarting the instrument or when the filters get clogged. It seems safer to operate as you said yourself by reducing the difference in inlet pressure between cylinders and ambient air to avoid the need for an empirical correction.

Section 5: did you perform more than one test to assess the variability? It would be interesting to plot the biases between the assigned dry value and the wet values depending on H2O for Picarro and your own correction for the three species. On the same subject: p15 l22: what is the level of residual water? Why not invest in a -60°C cryocooler and get rid of any correction as you are using already a crycooler system? Especially if you refer yourself to the paper of Reum et al. in discussion in AMT (Reum, F., Gerbig, C., Lavric, J. V., Rella, C. W., and Göckede, M.: An improved water correction function for Picarro greenhouse gas analyzers, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2017-174, in review, 2017.) that shows that the H2O correction is biased when almost dry due to the sensitivity of the pressure sensor with H2O.

Section7: Can the ambient air difference be due to the non-linearity of the RGA-3 or to the fact that the H2O correction is not good enough? The difference does not seems to increase strongly over time but more to vary around a bias.

Technical comments:

p1 l29: not clear, please rephrase

p2 l7 replace “being.. much lower” by reducing

p2 l3 replace “ones” by “techniques”

p2 l26: add “of” after “physical discussion”

p2 l27: “as follow”

p3 l6 “serial number” should go before the actual serial number

p3 l7: remove “to the CRDS”

p3 l9: cite as well here Yver Kwok et al. As the tests are described in this paper while the specifications gives the tresholds.

p3 l11: In Yver Kwok et al. the terminology for the precision test is continuous measurement repeatability (CMR), rephrase for example as “The first test, defined in Yver Kwok et al; as the CMR test consists...”

p3 l12 put “being” after “the first hour”. This type of exchange appears throughout the text, please check.

p3 l15: Replace precision by CMR

p3 l18: this test is what was called reproductibility before and in ICOS-ATC LTR or long term repeatability. Add ATC after ICOS as ecosystem or ocean could have defined other terms.

p3 l24: thresholds

p4 l2 Replace “Repeatability test” by LTR

p4 l5 use proper units, mbar not mb

p4 27-28 delete “to” before “the computation”

p6 l2 delete “tot” before “the raw CH4”

p6 l12-13 you multiply p84sw by 1000, then p84sw’ should be in ppb contrary to what is mentioned.

p6 l28: numerical

p7 l28 It is a new paragraph and the transition is not smooth, please add a transition.

p11 l15 Refer to section 7 for more investigations.

p14 l 7-8: move “being” after “CH4”, add “s” to coefficient

p15 l7 what is pph?

p15 l16: why is there two inlets, what is the purposes of switching between the two every day?

p16 l8: Rephrase “For not discarding” in “To keep”

p18 l18: Can you comment on the reason of the larger differences for CO2 and CH4 for these particular months? As it is both for CO2 and CH4, it seems to indicate that the CRDS would be the cause?

p20 l10: Replace “for comparing” by “to compare”

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