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 #3

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Gomez-Pelaez et al. present both laboratory and field test results of a commercially available CO2/CH4/CO cavity ring-down spectrometer (CRDS). The authors discussed the results within the context of several relevant international programs, e.g. Global Atmosphere Watch (GAW) and the European Integrated Carbon Observation System (ICOS). Being aware of recent development of greenhouse gas measurements using the same type of analyzers, the authors tried to improve the water vapor corrections for CO2 and CO, and to determine the drift rate for the pressure and temperature sensors located inside the CRDS cavity. As the development presented here is some

sort of changes to or confirmation of the published methods and results, it is therefore in several places an overstatement for novelties. Furthermore, several methods and results are not (yet) convincing based on the presented results, see below.

I do agree with the second reviewer that the manuscript will benefit from English editing by a native speaker.

The authors tried to present a way of explaining the dependence of the CO2 measurements on the flow rate, i.e. the outlet valve number, in Sect. 3.1. More information is needed to explain how Eq. 1 was derived. Was it derived from 2-point inlet pressure measurements? Appendix A gives a very nice theoretical analysis; however, I do not find it convincing to support the linear relation between actual CO2 and raw CO2. The equation apparently corrects the flow effect, which may actually reflect changes in something else, e.g. cavity temperature or pressure. Please show the raw measurement data to support this empirical equation.

Water vapor correction for CO: the authors rearranged (combined) the existing equations to fit a single equation to the experimental data. Statistically, the use of the 4000-data running mean should not change the results? Have the authors tried to fit the equation to the raw data?

With all the efforts to improve the water vapour equations, why did the author decide to include a cooler to dry the air?

The use of a large number of symbols makes it difficult to read. I would recommend simplifying them and showing only the necessary ones.

The Fortran 90 code does not make the work novel, and there is even no need to mention it in the main text.

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