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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of continuous water vapor δD and δ^{18}O measurements by off-axis integrated cavity output spectroscopy" *by* N. Kurita et al.

Anonymous Referee #2

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The paper presents a detailed assessment of the accuracy of the combined LGR in-situ Water Vapour Isotope Analyser (WVIA) and calibration system (Water Vapour Isotope Standard Source - WVISS). The manuscript illustrates a novel assessment of the long-term stability over a number of months. This is a valuable addition to the literature as it clearly indicates frequent correction for time-dependent drift is required for in-situ monitoring of water vapour isotopes using the WVIA. An innovative approach to characterise the H2O concentration dependence of the WVIA isotopic measurements is introduced taking into account the concentration dependence of the WVISS. Finally, the authors introduce a calibration procedure to successfully correct for time dependent drift and

the concentration dependence and illustrate the accuracy by comparing against cold-trap samples. The manuscript is well structured although the authors should review the manuscript for a number of small grammatical errors.

Page 2824, line 2, refer to the Griffith paper amongst other references as a laser technique, the Griffith paper discusses an FTIR method so uses a broadband source rather than a laser. Suggest changing "...utilises laser based..." to "...utilise instruments based on optical spectroscopy..." (Page 2823 line 26)

Page 2824, line 14, suggest changing "... laser instrument ..." to "...in-situ instrument..." See comment above.

Page 2825, line 5, what is the time frame of long-term stability?

Page 2825, line 18, what changes were made in the software update?

Page 2826, line 1, 10 s should be 10μs

Page 2827, line 17, how stable is the cavity temperature?

Page 2827, line 17, I suggest adding the cavity volume to illustrate the exchange rate for the cavity.

Page 2830, line17, it is not obvious what is meant by analytical uncertainty.

Page 2831, line 5, can a concentration dependence be ruled out as the source of the enrichment for the raw δD values retrieved by the WVIA?

Page 2831, line 15, but your uncertainty for your cold trap δ18O collected at 10000ppm and shown in figure 2 appears larger than 0.15‰ so I don't think it is possible to rule out the variability in the cold trap values as a significant contributor to the scatter in figure 3b rather than it being attributed to just the WVISS.

Page 2832, line 5, inefficient evaporation in vaporisers tends to lead to increased variability in the H2O concentrations and isotopic values. The noise arises from liquid being

deposited on the hot surfaces of the vaporisation chamber which then evaporate. This is observed as spikes in the H2O concentration and the isotopes. Inefficient evaporation therefore tends not to produce biases when collecting water vapour samples over the time period the cold trap samples were collected (2-6hrs). For there to be a bias due to inefficient evaporation, the liquid must build up in the vaporisation chamber and not re-evaporate. It is therefore unlikely inefficient evaporation in the WVISS would be a source of the biases for the cold trap isotopic values. Although the authors discount inefficient evaporation as the source of the cold trap biases, it is unlikely to produce negative biases as they suggest.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 2821, 2012.