Review of 'Characterising water vapour concentration dependence of commercial cavity ring-down spectrometers for continuous onsite atmospheric water vapour isotope measurements in the tropics' by Komiya *et al*., submitted to AMT

This manuscript presents a characterisation of concentration dependence of 2 commercial cavity ring-down spectrometers at 4 high water concentration levels between 21500 and 41000 ppm. The authors assessed the calibration results using 4 different calibration strategies, and for each calibration strategy using 5 different fitting functions. The authors concluded with identifying the most appropriate calibration strategy and fitting choice for their two specific instruments.

The relative new aspects of the study are the focus of the calibration at high water concentration levels (21500 to 41000 ppm) and the assessment of different calibration strategies (including fitting choices). The manuscript is relatively well written. Below I have detailed 2 major points, and some minor issues with suggestions.

Major comments

1. One key aspect of the study is to test the 5 calibration strategies. A general question would be: what motivates the authors to choose *these specific* calibration strategies in the first place? In other words, what is the purpose or hypothesis, advantage, and disadvantage behind each specific strategy? It would be more clear and helpful if the authors could briefly clarify these questions before presenting the methods and results.

2. The authors have described a custom-built calibration unit. The unit's working principle is similar to the commercially available (since 2013?) Picarro Standards Delivery Module (A0101). What is the specific motivation for the authors to build their own calibration unit? What main differences or advantages do the authors achieve?

Detailed comments

Page 1, Line 12: 'isotope ratios' is confusing here since it normally refers to R and not delta-notation. It may be replaced with 'isotope compositions'. The term 'isotope ratios' has been used in many places in the manuscript, and all should be reconsidered or replaced.

P 2, L 17: 'models' replaced to 'model '

P 2, L 26: To make the structure more clear, suggest to add 'In addition, ' before 'Moreira et al.'.

P 2, L 37: To make the sentence more clear, suggest to remove 'expected based on past measurement at the ATTO site' or place it in a new sentence.

P 3, L25: Maybe remove '(Fig. 1)'. This is already referred to in the beginning.

P 3, L40: Is the purpose to remove 'salt compounds'? I would suppose that there is very low salt contents in the fresh water (if the original water is fresh water and not sea water, otherwise it should be stated). I think the purpose is to in general remove contaminants.

P4, L21: The statement is very strong here so that it requires proof. If it is/can not be proved, it is rather a hypothesis or speculation. Also, this statement is in contradicted to the statement in P9, L15. Maybe replace 'any' to 'to a large extent the' or something like this.

P4, L26: Not really common in the literature to use "[H2O]" as abbreviation. "[H2O]" has appeared in many places to represent 'water concentration level'. I personally feel it hinders the reading flow. Maybe it is better to use 'WCL' or simply 'concentration'?

P4, L29: 'Thus, the isotopic deviation values at 21,500 ppm are set to 0.' Personally think this sentence is redundant and can be removed with no harm.

P4, L29: ‘(Fig. 2)’ can be removed here.

P5, L7: ‘(Fig. 3)’. It is better to assign each subplot with a letter, and refer the description to the exact subfigure, for example ‘(Fig. 3a)’. With this context, suggest to add letters for all the subplots in Fig 3, 4, 6, and 7, as you have done for other figures.

P5, L16: ‘For example,’

P5, L16: Suggest to remove ‘=’, also for the other occasions throughout the manuscript.

P5, L26: Suggest to remove ‘For instance,’.

P5, L35-38: The sentence is redundant. Suggest to change to ‘For each calibration strategy, we also calculated RMSE value for each of the [H 2 O]-dependence 2D or 3D fittings’.

P6, Table 1: Remove the bold title.

P9, L12: ‘(1.1%).’ to ‘(1.1 %)’.

P9, L12: Suggest to remove ‘(> 40,000 ppm)’.

P9, L125: Should be ‘lower’ precision? I can see the standard deviation becomes larger at high concentrations.

P9, L126: Following above, should it be ‘decrease’?

P9, L133: Remove ‘At all H 2 O concentration levels, and ’.

P9, L137: Again, the statement here sounds strong. It seems that it has been proved, but actually not in the manuscript. Therefore, I would say it is more like a speculation or hypothesis. Suggest to change ‘mainly be’ to ‘is likely’ or something similar.

Same applies to P11, L17.

P10, L8: Add space before unit ‘‰’ and check all other units to be consistent.

P10, L16: Should be ‘Fig. 5a-d’.

P10, L17: Should be ‘Fig. 5b’.

P10, L18-19: This is an interesting observation. There is recently also a systematic study on concentration dependence that emphasizes this isotope-dependency. Probably this is something worthy to be discussed?

Weng, Y., Touzeau, A., and Sodemann, H.: Correcting the impact of the isotope composition on the mixing ratio dependency of water vapour isotope measurements with cavity ring-down spectrometers, Atmos. Meas. Tech., 13, 3167–3190, https://doi.org/10.5194/amt-13-3167-2020, 2020.

P12, L10: Refer exactly to subfigures such as (Fig 6e, j).

P12, L23: It would be helpful to explain the method before instead of going directly to the results. It is not clear for the readers what have been calculated here and how they are calculated.

P12, L39: ‘smaller sample numbers for calculating RMSE (28 h: n=43, 196 h: n=19; c.f., Fig. 2)’. It is confusing here because it seems to me the short-interval calibration has larger sample numbers (n=43).

P12, L31-39: This paragraph jumps back to Fig. 6. Suggest to move it up after L19, before presenting Fig 7.

P16, L2: Replace ‘the CRDS’ to ‘CRDS’.

Fig S1: delta^{2}H instead of delta^{18}O in first line.