

***Interactive comment on* “Technical Note: Calibration instrument for the krypton hygrometer KH20” by T. Foken and H. Falke**

T. Foken and H. Falke

thomas.foken@uni-bayreuth.de

Received and published: 29 May 2012

First of all we want to thank the reviewer for his helpful comments. We have adopted his technical corrections, except in the cases where special remarks are made below. The specific comments we have addressed in the following way:

1. p1697, lines 15-16: We have thought that use of an absolute humidity chamber during field campaigns is reasonably practical. The disadvantage of this method, compared to the variable path length method used in the present paper, is that the absolute humidity chamber method is time consuming. I suggest that the disadvantages of the absolute humidity chamber method be presented.

Besides the time consuming nature of the humidity chamber methods and longer interruptions of the measurements, our second argument was the absence of humidity chambers at very remote measuring places as we used on the Tibetan Plateau or in Arctic. We have included both arguments in the text.

2. p1702, line 5: The HMP45A is no longer available – I suggest specifying an alternative.

The new sensor HMP 155 has the same technical specification. We have included a remark.

3. p1703, lines 6-20: Were the calibrations for scaled windows? More detail in relation to cleaning and scaling of the windows and its impact on calibration/calibration procedures is suggested.

The problem of clean and scaled windows was discussed on p. 1705 lines 5-8 and 20-22. Because of the great importance we have made an additional remark in Chapter 3.2.

4. p1708, Table 1. The correlation coefficient needs to vary for different numbers of paired measurements used in the calibration.

More details are given in the instruction manual (Foken and Falke, 2010). There, 20 data points for a path of 20 mm are recommended. For this case about 8 data points are in the linear range. We have included a remark in Table 1.

5. p1709, Table 2. In the Abstract, line 5, mention is made of the main application for calibration at high altitudes and low temperatures. And yet in Table 2, no mention is made of these low temperatures.

The benefit of the krypton hygrometer in comparison to IR-hygrometers is the higher sensitivity for low water vapour pressures. These are a given for low temperatures and therefore also for high altitudes, because even in summer on the Tibetan Plateau the temperature is close to zero. We have carried out a special winter time expedition on

the plateau in February. The results will be published soon.

6. p1715, Fig. 6, The data points reflect a non-linear relationship between x and y ($-\ln V$ vs X). What basis was used to obtain the straight line depicted? For example, the last ten points could also be used to obtain a straight line. Also, it would be important to justify why a non-linear relationship should not be used when the data points express this non-linearity.

You are right that a non-linear relationship would be much more appropriate. Unfortunately all available eddy-covariance software packages allow only linear calibration lines. Therefore Campbell Scientific, Inc. (see manual) always linearized the calibration line. Also the widely used IR-hygrometer LiCor 7500 uses an internal linearization. In our system – similar to Campbell Scientific, Inc. – we start the regression with three points close to the optimal path length of the last calibration (or path length given by the operator or recommended by Campbell Scientific, Inc.) and add more points to both sites as long as the high correlation is fulfilled (Foken and Falke, 2010) according to Table 1.

e. p1698, Eq. (2) and lines 15-21. The definition of f , used in Eq. (2), should appear earlier – at the end of the sentence on line 16.

We are very sorry, during the typesetting Eq. (3) was included twice but not Eq. (2) and we did not recognize this. We will carefully check the final manuscript and ensure that Eq.(2) will be included and no further misunderstanding will be possible.

References:

Foken, T., and Falke, H.: Documentation and instruction manual for the Krypton hygrometer calibration instrument, Arbeitsergebn., Univ. Bayreuth, Abt. Mikrometeorol., ISSN 1614-89166, 42, 20 (update 2011), 2010.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 1695, 2012.