



Interactive comment on “Laboratory evaluation of the effect of nitric acid uptake on frost point hygrometer performance” by T. Thornberry et al.

Anonymous Referee #1

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The manuscript is an evaluation of a key measurements technique in atmospheric research, i.e. frost point hygrometry, and addresses the sensitivity of this technique on HNO₃ uptake which potentially may impact the hygrometer's performance. The systematic investigation of this effect which is done here in laboratory experiments, is important with the background of unresolved discrepancies of different hygrometers during field and laboratory experiments in the past. Therefore this work is an important and timely contribution on the understanding of measurement techniques.

The experiment is well designed and described in the manuscript. The results are

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sound and derived consistently from different aspects, i.e. analysis of a potential frost point interference, quantitative analysis of HNO₃ uptake and comparison with previous work (Szakall et al). The finding, that under the relevant atmospheric and operational conditions a significant interference of HNO₃ uptake can be excluded from the laboratory study provides additional confidence in the frost point hygrometer not only for the particular instrument, but also for the technique in general.

The paper is well written and can be published as it is. I give only a few comments in the following which are however not essential for the primary objective of the manuscript.

(page 3727, line 11) is the disagreement rather an offset than a relative disagreement (25-100%)

(3732, 4-9 and 3734, 1-2) To what extent do the authors use the permeation source as a reference standard? Is it more reliable than the frost point method itself? What is the potential uncertainty due to the MFC used in the experimental setup? – It's not affecting the analysis concerning the HNO₃ sensitivity, but might be of interest in general.

(section 3.1) The authors should consider to include a table with the individual experiments carried out (at which H₂O, HNO₃, what are maximum deviations etc).

Editorials:

(3728, 29 and in reference list) Schauble

(3729, 2) AIDA is not explained

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