Atmos. Meas. Tech. Discuss., 7, C4744–C4746, 2015
www.atmos-meas-tech-discuss.net/7/C4744/2015/

Atmospheric Measurement Techniques Discussions

Interactive comment on "High-resolution continuous flow analysis setup for water isotopic measurement from ice cores using laser spectroscopy" *by* B. D. Emanuelsson et al.

Anonymous Referee #2

Received and published: 29 January 2015

General Comments.

This paper outlines the continuous analysis technique used to measure water stable isotopes for an Antarctic ice core with an Off-Axis Integrated Cavity Output Spectrometer attached to a modified Water Vapor Isotopic Standard source Calibration unit. Modifications included the addition of a customized furnace and evaporation chamber inside the calibration unit which lead to reduced instrument response times and memory effects. The paper discusses in detail the differences in precision between 4 different systems. The reduction in evaporation chamber volume in addition to the shortening of sample lines significantly reduced the system response time; which is important when

sampling ice cores with high frequency changes in isotopic values along the length of the cores. The improved sample response time was however, at the expense of instrumental precision which was affected by an increased amount of signal drift. The paper is written in a comprehensive manner and provides significant detail about system performance which is helpful for those who which to setup their own water isotope system, whilst giving insight into the parts of the system which are potentially detrimental to factors such as system response, accuracy and precision.

Specific Comments.

p12082 L17 This paragraph is confusing. It is not always clear as to which modified WVISS unit the authors are referring when quoting the Allan precision values. When the 'modified WVISS unit' is referred to, is this the 2013 or the 2014 version or both? Perhaps it would be clearer if more distinct names were used for the different setups. Also, it is difficult to follow when they are switching from talking about precision in one instrument to Allan value in another (line 19-21).

P12086 L26. The objective of the study was stated as the establishment of a high temporal resolution ïĄď-CFA setup. This has already been achieved in other studies (such as Maselli et al. 2013), so this study is left to focus specifically on the application of a LGR-IWA spectrometer and modification of an established calibration unit to a high resolution ïĄď-CFA setup.

P12091 L3. "accomplished by a step in PFA tubing sizes," Unclear what the author is trying to say – how is a step (up or down) used in the setup? P12092 L1. Why remove the gas from the sample line with DB1, and then immediately add the air again? Will part of the sample stream leaving DB1 be used for other analytical systems that require a degassed water sample? Please explain.

P12095. Do you have an explanation for why the modified setup experiences more drift? Since the ice core records are primarily focused on the larger frequency changes (> annual) in the isotope signal should minimizing drift (which would affect the accuracy

of the results) be a priority over precision of measurement? Perhaps the author should make some comment as to whether higher temporal resolution or precision or accuracy is of the greatest importance when analyzing ice core samples – thus indicating which system (including the Copenhagen setup) is the most appropriate to use for ice core analysis.

Technical Corrections.

P12086 L16. Where previously the authors referred to the 'modified' unit it is now relabeled as the 'custom' unit. Consistent labeling will enhance clarity. P12090 L2. "Glass was chosen to permit to form the desired shape" . This sentence is unclear.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 12081, 2014.