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Atmospheric Measurement Techniques Discussions

Interactive comment on "An integrated flask sample collection system for greenhouse gas measurements" *by* J. Turnbull et al.

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General Comments: The collection of air samples using flasks has become a feature of many atmospheric measurement programmes. With these data being used, as the authors point out, to provide comparisons with in situ instruments and also a method for the determination of species not feasibly measured in situ. The timing issues as a result of different time constants for in situ instruments, meteorological processes, source/sink variability and modelling interpretations have in the past been compensated for after the collection of flasks over short time frames, or as the authors point out by sampling flasks during periods of low variability. The Integrating Pump described here is an important contribution, providing a means of reducing timing is-

sues and matching time frames at the time of sample collection. The methods used here are sound although flow rates are incorrect (see technical note below). The validation experiments are well thought out and demonstrate clearly the need for such a flask sampling integration system, and the effectiveness of the method described in the paper.

Specific comments. The authors appear to have made an error in defining the flow rates used for their Integrating Compressor. They state that the high flow rate is 3800 standard litres per minute, however this flow rate does not work in the e folding calculations they use, and in addition they describe the use of two cylinders of gas, flowing at 3800 standard litres per minute. At the flow rate of 3800 standard litres per minute a 30 L cylinder at 140 bar would be empty in 66 seconds and a 50 Litre tank at the same pressure in 110 seconds. The e folding calculations do work at much lower flows (3.80 standard litres per minute), however the flow rate used will need to be verified by the authors as much of the material discussed in the manuscript requires the flow rate to be correctly defined. It would be useful if the authors could name the make and model of the pump used in this Integrating Compressor system, as well as the mass flow controllers as this would provide insight for readers if they wished to undertake similar sampling strategies. It is unclear from the text how the high flow is measured when the fast flush valve is open to provide the 3800 SLPM flow, the author should consider describing this. Figure 1 refers to a 0-1 SLPM flow controller while the text refers to a 1000 SLPM mass flow controllers the authors should correct the instance that is incorrect.

Technical corrections: The authors use the term "standard liters per minute (SPLM)" throughout the manuscript, where a more common acronym SLPM could be used. There are several units used in the manuscript that are not SI units, these are: Kilopascals (kPa) should be used in place of psia, (P4085 Line 2& 28, P4086 Line 9). Hectopascals (hPa) should be used for atmospheric pressure in place of mbar,(P4081 Line 13). Millimeters (mm) should be used in place of inches, (P4080 Line 1 & 19). The

authors use the term “mixing ratio” when referring to the mole fraction of CO2 and other gases, this is an ambiguous term and mole fraction is preferred. P4078 Line 14, “Due the extreme” should read “Due to the extreme”. The outside diameter of Synflex tubing used should be described (P4079 Line 23). Consistency in units for liters needs to be addressed, in some places l is used and in others L. Over-sampling and oversampling are both used, one should be used to keep the text consistent(P4087 Line 8 &12).

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 4077, 2012.