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Atmospheric Measurement Techniques Discussions

Interactive comment on "Development of a new JMA flask sampling and trace gas measuring system for observation on a cargo aircraft C-130H" *by* K. Tsuboi et al.

Anonymous Referee #3

Received and published: 24 October 2012

The manuscript 'Development of a new JMA flask sampling and trace gas measuring system for observation on a cargo aircraft C-130H', manuscript by K. Tsuboi et al. describes in detail the newly developed flask sampling set-up and analytical system used on a C130 aircraft. Results of different analytical techniques are compared, and flask results are compared with ground based measurements over Minamitorishima.

The manuscript contains some valuable comparisons and shows that modern analytical instrumentation (WS-CRDS, ICOS) can successfully be deployed for flask analysis. However, it contains only little new information. Therefore I can recommend publication

in AMT only after addressing following major recommendations.

General remarks

The presentation quality of the paper (especially English language, redundancies) needs to be significantly improved before publication in AMT can be considered. Over large parts, it is very descriptive, and sentences are sometimes not clear.

As referee#1 already mentioned, the introduction is focused on Asia and does not properly account for other aircraft measurements that have being made. The introduction needs to be revised.

Concentration should not be used; use mole fraction instead.

A general concern is that the presented work used flasks that were only stored up to a few days before they were analyzed. Often, the time between sampling and analysis will be longer, and more information about long term stability is needed.

It is also not very clear what the additional value of airborne flask samples is. These new analytical techniques would allow highly time resolved measurements during flights if the instruments are directly deployed in the aircraft (as it is done in other programs). Such measurements would provide altitude dependent mole fraction profiles, which could be especially valuable at remote sites. Are airborne flask samples really a contribution that is needed?

Specific comments:

Figure 4: It should be considered to use a different color for ambient data and flask results.

Section 2.2: The use of the manual pump (modifications? what do you mean with manual?) is not well enough explained.

It is mentioned that the new flasks are made from titanium, but low level flight flasks over MNM (p 7075, line 3) were collected in SS flasks. Is this a mistake, or were

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different types of flasks collected?

Section 3.2: Why were the flasks only stored for 2-10 days between measurements? To properly evaluate drift, longer storage times would allow better quantification of the drift and reduce the corresponding uncertainties. If such data are available, they should be included in a revised version.

Table 1: It is unclear what you mean with 'conventional method'.

Figure 4: The uncertainties are mentioned in the text, but never quantitatively. It would be good to show uncertainties in the figure (error bars) to prove that the instruments are linear within the uncertainties of the analytical methods.

Section 3.6: Discussion of CH4 and N2O isotope effects is somewhat useless considering the much larger uncertainties of the GC methods. This should clearly be pointed out in a revised manuscript, in which a more detailed discussion of the different contributions to the overall uncertainties should be given.

The consequences of the isotopic effect of the CO2 analysis should be more clearly described. There are several possible approaches to solve this issue. E.g. a correction could be applied if the isotopic composition of the standards is known.

The improvements of the system (lower flow rates but still sufficiently fast response times?) are several times mentioned in the manuscript, but never described in detail. More information is needed before publication can be considered.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 7067, 2012.