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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 #4

Received and published: 31 October 2012

The manuscript 'Development of a new JMA flask sampling and measuring system...' by Tsuboi et al. describes a procedure to collect discreet air samples from an aircraft and the analytical system built to measure these samples. Carbon dioxide, carbon monoxide, methane and nitrous oxide are determined in each sample. The measurements are made as part of a program to study Asian outflow over the Western Pacific.

The work described in this manuscript is not very innovative, as many laboratories have constructed analysis systems to measure multiple trace gases. And unfortunately the paper provides only adequate characterization and quality evaluation of their system;

not the quantitative analysis required for AMT. I do not recommend publication in its current form.

Below are suggestions and comments the authors should consider for any revision. I try not to repeat those of the other reviewers.

Page 7071 Line 5: How long does it take to fill a sample and what distance does the aircraft cover during filling? Page 7071 Line 10: The sample collection system is run manually, requiring two attendants. Was an automated collection system considered? Page 7071 Line 20: What kind of pump is used? Page 7071 Line 25: Describe how the sample is collected using a manual pump.

Page 7072 Line 12: Where is the analysis system located? Page 7072 Line 23, Figure 1: The figure suggests two separate cooling lines, why is this? Why are heaters located before the cold traps?

Page 7073 Line 6: What is meant by 'subsample flow'? Is this the purge gas? Page 7073 Lines 13-15: I do not understand what is meant by '. . .subsample flow maintained for 10 minutes . . . last 3 are used to calculate results'. Please clarify

Page 7074 Line 2: How are stabilities of primary reference gases determined?

Page 7075 Lines 4-5: Why were the samples measured at MRI? Is this where the JMA analysis system is operated? Page 7075: Lines 11-25: The differences between aircraft and surface samples are quite large. However the is always the possibility that on any given day the two altitudes sample different air parcels. Do air samples collected during descent to Mimamitorishima show a vertical gradient? Page 7075 Lines 18-20: The differences between in situ surface measurements and the aircraft flask results are large enough for concern. But I also agree when the authors indicate the differences hard difficult to interpret. The correct experiment is to equip the aircraft with the lab instruments and compare the in situ versus flask results.

Page 7076 Lines: 1-20: The mean growth rates and large standard deviations of the

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means suggests the may have been significant change in the samples. Different flasks in a batch may behave differently. The statement that there was no significant drift in the mean of 28 samples is deceptive: it does not mean there was no drift in the flasks.

Page 7076 Line 23, Figure 3: I do not see the value in this figure, it should be removed. The key results are in Table 1.

Page 7077 Lines 20-25: What is meant by 'comparable'? Please be more quantitative.

Pages 7078-7080: The isotopic signatures of the working standards should be measured not estimated.

Page 7081 Lines 8-10: A brief description of this experiment is needed. Page 7081 Lines19-21: This statement is not sound and should be removed. Page 7081 Line22-25: Note that C. Zellweger has a new paper in AMT which examines Picarro and Los Gatos instruments. Page 7081: This paper needs to quantitatively examine the total measurement error s a combination of the error in step of the sample analysis. Simply looking at the errors discussed in this manuscript; that related to the flask sampling (the difference between surface and aircraft samples) is the largest. This could easily be studied more rigorously.

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