

Response to Reviewers

Manuscript Number: AMT-2015-289

Manuscript Title: A broadband cavity enhanced absorption spectrometer for aircraft measurements of glyoxal, methylglyoxal, nitrous acid, nitrogen dioxide, and water vapor

The discussion below includes the complete text from the reviewer, along with our responses to the specific comments and the corresponding changes made to the revised manuscript.

All of the line numbers refer to the original manuscript.

Response to Reviewer #2 Comments:

This paper reports development of an airborne LED-CEAS system which shows extraordinary stability in terms of pressure change on the aircraft (the authors were able to back out mirror R based on pressure-induced number density change of air!). The paper is well written and is suitable for publication on AMT with only a few minor points as below.

We thank the reviewer for the positive review. Listed below are our responses to the comments and the corresponding changes made to the revised manuscript.

Page 11213, line 11, “underscore” -> “underscores”;

Changed.

Section 2.2, I am (and I believe the general community of field CEAS are) interested in this novel cage design based on carbon fibre rods which was first introduced in Wild’s paper and then adopted here. A couple of questions about fine details: (1) how did you adjust for alignment between the two mirrors prior to locking them? (2) if you use o-rings to make seal, will they not be the most sensitive components in the whole design that are vulnerable to pressure change? How did you cope with this?

We have added the following text:

Pg. 11216, line 25-27: “Custom-designed aluminum plates aligned and locked parallel to each other on the carbon rods provide robust alignment without the use of spring-loaded, commercial mirror mounts. As shown in Fig. 1a, the final alignment of each aluminum plate can be adjusted using fine adjustment screws (F6SS058; Thorlabs, Newton, NJ, USA) that are locked to the carbon rods at opposing corners of the plate. Following the fine adjustment, the aluminum plates are secured to the carbon rods using split-clamp mounts. The cavity mirrors are sealed to the cage system using compressed o-rings that allow the mirror face to fully contact the metal plate, eliminating variable compression of the o-ring with cell pressure and minimizing pressure sensitivity. This system provides stable optical alignment...”

Page 11219, I am not sure whether a relatively constant CHOCHO/HCHO ratio during field measurements SENEX 2013 is a convincing evidence supporting the negligible effect of RH on inlet transmission efficiency of CHOCHO, given the large uncertainties wrt source/sink terms of these two species and their relations with RH.

We agree with the reviewer that the lack of correlation between the CHOCHO/HCHO ratio and relative humidity is not sufficient evidence for quantitative transmission of these gases through the aircraft inlet. However, this result supports our inlet transmission tests, and may be useful to readers.