

Interactive comment on “Greenhouse gas analysis of air samples collected onboard the CARIBIC passenger aircraft” by T. J. Schuck et al.

Anonymous Referee #2

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The paper titled “Greenhouse gas analysis of air samples collected onboard the CARIBIC passenger aircraft” by T.J. Schuck et al., should be published with the authors addressing the two suggestions for revisions below. I am very supportive of papers like this being published in the peer-reviewed literature. This paper reports a very creative approach to sampling greenhouse gases aboard commercial airlines, and their method needs to be published. The authors report a unique signature in air masses in different seasons for methane (CH₄) -carbon dioxide (CO₂), tracer-tracer correlations. The authors also report an interesting delay in the transport of the seasonal cycle from lower to upper atmospheres. I have two major concerns that I would like the authors to address: (1). There is a significant artifact for carbon dioxide in wet samples where carbon dioxide is lower than normal, sometimes by 40 ppm. The effect is worst for low latitudes in both hemispheres and below 2 km (boundary layer). However, on a
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recent NCAR mission, the effect was seen in samples between 2 and 7 km, and a few in samples above 7 km. It is hard for me to judge whether there is a problem since few transects are plotted. Why didn't you dry the air for in situ and flask samples? Is the inlet for greenhouse gases forward facing or backward facing? Forward facing inlet can permit more water from rain, clouds, and ice crystals. So, what did you do to reduce the impact of wet samples on CO₂? Is it a problem in your data? (2). I would like to see a little more science in this paper. For example, how do your CH₄ vs. CO₂ correlations compare with others? What does the delay in seasonal cycles between lower and upper atmosphere tell us about transport? Compare delays to others, like the balloon and aircraft studies of Steve Wofsy and colleagues? The paper is well written. It should be published.

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