

## ***Interactive comment on “Airborne measurements of oxygen concentration from the surface to the lower stratosphere and pole to pole” by Britton B. Stephens et al.***

**Anonymous Referee #2**

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This is a very detailed, and most impressive, account of the experiences the groups made on sample and measurement strategies for atmospheric O<sub>2</sub>. The level of meticulousness is rarely seen. To quote the first sentence of the conclusions: "Over the past two decades, we have developed and improved airborne systems for in situ and flask based measurements of 25 atmospheric O<sub>2</sub>" You can say that again! "and with an aim of aiding other investigators who may wish to undertake similar measurements."

Many other groups in the field must humbly recognize that they have not advanced to this level of diligence. And for those groups planning to enter the field, it is a clear demonstration of how difficult and demanding atmospheric O<sub>2</sub> measurements at the

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10-6 level really are.

I recommend publication in AMT.

As for the contents, I found the paper very clear, and easy to read (although of course the great level of detail requires most careful reading). I only have a few questions/remarks, that the authors might want to address:

Page 11 why replace the 150 ml of air during / after CO<sub>2</sub>, O<sub>2</sub>/N<sub>2</sub> and Ar/N<sub>2</sub> but before CO<sub>2</sub> extraction? Is this to avoid possible increased permeation until the next measurement? And: A subsample of 90 ml means a very small amount of CO<sub>2</sub> for stable isotope analysis, and surely for 14C. I think you mean this is for the second CO<sub>2</sub>, O<sub>2</sub>/N<sub>2</sub>, Ar/N<sub>2</sub> measurement? I expect that for 13C and certainly 14C all remaining CO<sub>2</sub> will be extracted? Please change the text to make this clear(er).

PAge 17, lines 8-9 "It was designed to reduce the well-known tendency of aircraft inlets to differentially sample heavy and light aerosol particles (e.g., Belyaev and Levin, 1974), a similar effect to our observed separation of heavy versus light molecules."

I have my doubts if these effects are really similar (particles floating in air vs the air molecules themselves), but as the design apparently also serves your goals, something similar must exist...

The title of 4.2.1 For a while I thought that you were going to discuss some kind of physical filter in the inlet of the system, but it is a data filter. I would add that in the title of the paragraph.

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