Response to Reviewer 2

We thank the reviewer for comments and helpful suggestions.
Specific comments are addressed below, shown in "italics".

Specific comments: Page 3, line 14: It would be better to mention the weight of the 29.5-L Luxfer cylinder.

Response: OK, we added this to the text: "(~22kg empty)"

Page 3, line 23: What are the weighing capacity and the readability?

Response: We updated the following text in this sentence: "… mass comparator (Sartorius CCE40K3, 40 kg capacity, 2 mg readability) ….

Page 4, line 17-18: This purification procedure can remove non-condensable gases but cannot remove water vapor. Is it possible to add additional cold trap at -100°C between the 50-mL and 5-mL containers to reduce the water vapor?

Response: It would be possible to install a water trap, but since the water vapor purity correction was relatively small, we chose to account for H2O in the purity coefficient.

Page 6, line 1-2: In Table 1, the suffixes '_a' and '_b' mean 'initially present in cylinder' and 'aliquot in 5-mL container', respectively, while the subscriptions 'a' and 'b' in the text mean the exact opposite. It's very confusing.

Response; Thank you for pointing this out. We have made the correction in the table.

Page 6, line 2-3: It would be better to clarify that n_{air} comes from natural air initially present in the cylinder and the dilution gas.

Response: We have made this clarification.

.... n_{air} is the total moles of air (sum of natural air initially present and dilution air), p is the purity .....

Page 6, line 15: I think the molecular weight of 28.9621 is not for the dilution gas but for natural air including ambient level of CO_2. From the composition of the dilution gas listed in line 17-18 (He should be included in the dilution gas) we obtain the molecular weight of 28.9560. Moreover, I think that the molecular weights of the natural air initially added to the cylinder and the dilution gas were needed to calculate the moles of the initially added natural air and the moles of the added dilution gas because these molecular weights are not necessarily same. However, the authors used single molecular weight of 28.9621 for the air with ambient level of CO_2 to compute nb and nair because the differences in the molecular weight among these airs doesn't practically cause significant differences. I think the authors should clarify how to compute the moles of the gases used in this study.

Response: ***Thank you*** *for catching this. There was an error in our MW_{air} calculation. We mixed up the molecular masses of Ne and Xe. The revised molecular weight is 28.9602 g/mol. We use a single molecular weight for both quantities of air because we consider CO_2 and air separately. Since we account for the mass of CO_2 separately, the initial natural air (with CO_2 excluded) has essentially the same MW as the dilution air.*

Page 7, line 12: What is the BOC Spectra Seal process?

Response: BOC Spectra Seal is a proprietary process mentioned by name in Brewer et al. (2018).

Page 13, Table 1: I think it would be better to add the column of the total uncertainty for XCO_2.

Response: We agree. In the submitted manuscript we were unable to fit all desired columns into the table, and provided an extended Table 1 in landscape format as a Supplement. In the final published version we will work with AMT to reformat Table 1 to include additional columns.