We would like to thank the reviewers for their useful and detailed comments, and we are happy with the positive feedback from both reviewers. In the revised paper, we have addressed the important comments regarding the lack of laboratory test information, poor figure resolution, the apparent trend in the difference between active AirCore and tower CO_2 measurements seen in figure 7 (e), and the different spatial resolution due to diffusion of CO_2 and CH_4. We feel these have especially improved the scientific quality and technical details of the paper. In addition, we have addressed the many minor remarks that was pointed out by the reviewers. A point-by-point answer to all the remarks from reviewer #1 can be seen below, given in red text.

Reviewer #1 comments

Page 1. Introduction. This is very long winded, more suited to a thesis than a paper on measurement methodology. While I agree that some introduction is needed, maybe it would help readers if the wide ranging discussion on page 1 and page 2 up to line 22 was shortened considerably. It would be better to use the introduction to explain why measurement in the boundary layer is so valuable for CO2 and methane, and also potentially for other species, for example in pollution events. This is done briefly on P3 L13 on, but could be expanded. Active AirCore is a very powerful concept – say why it will be important.

- We have deleted four paragraphs, P2L21 to P3L22, regarding satellite, FTS and aircraft measurements, cutting out a big portion of the introduction to reduce the lengthiness.
- We've added two more sentences expanding on the importance and versatility of the Active AirCore: "… The Active AirCore provides a powerful tool to fill the vertical gap of GHG measurements between the surface and the lowest altitude usually reachable by aircrafts. The flexibility and mobility of the system makes it possible to make GHG observations at locations where tall tower measurements are not readily available. …"
- We've also added a few more references in terms of other uses of UAVs in atmospheric sciences:
  Watai et al., 2006, "… investigation of temporal and spatial variations of atmospheric CO_2 using a unique CO_2 measurement device attached to a small UAV (Kite plane) … "
  Kunz et al., 2017, "… and a dedicated CO_2 analyzer, COmpact Carbon dioxide analyzer for Airborne Platforms (COCAP), capable of being flown onboard small UAVs …"
  Khan et al., 2012, "… a small atmospheric sensor measuring CO_2, CH_4 and H_2O attached to a robotic helicopter …" .

P5 L 18 and 20. The 'box' – maybe give the box a name? – "AirCore box". You have another box later – "Analysis box" – and it's best not to get them muddled.

- This is now called the AirCore box

P6 L11. Relative humidity measurement. This seems to be a problem. Can you suggest a way around it, perhaps by relocating the sensor? It is important to have RH while sampling is taking place. P6 Fig 1. – maybe move this figure a bit earlier, say into P5? – it would have been helpful from the start of the description.

- The relative humidity sensor has been relocated to underneath the AirCore box in a newer version of the system. We've added a sentence stating this "… This has been resolved in the latest version of the active AirCore system, where the relative humidity sensor is now placed underneath the AirCore box. …". Figure 1 has been moved up to page 5.

P6 L20 – say clearly the CRDS at the landing ground of the UAV. It's a nice advantage of the method.

- We've added a sentence stating the landing site of the UAV close to the CRDS analyzer.
  "… , situated close to the landing site of the UAV. …"

P7 L13 – is there a way you can test with undried air?

- Yes, it should be possible to test with undried air. However, our roof inlet in the lab, which is the one that was used during the laboratory testing, is partially dried. New tubing would have to be implemented.

P8 L14 – in contrast to a FREE flying balloon. A tethered balloon doesn't have this problem. There are various ways to sample up to 400m – UAV AirCore as here, UAV pulling up tube, free balloon, tethered balloon with tube, tethered balloon with active AirCore. This method is good, but most of the others (except free balloon) have advantages too.

- Added the word 'free' too not confuse with the other types you mentioned.

P9 L12 – 3 4 ways into the water vapour 'dip' ?rise?

- Thanks for pointing out the error. We've changed it to the 'water vapor increase'.

P11 L10. Are there any plans to test this against measurements at a really high tower? Cabauw for example?

- We certainly seek opportunities to further validate and improve our active AirCore system in terms of the accuracy of both mole fraction measurements and the position registration of the air samples, e.g. at a tall tower, or comparing with aircraft measurements, or with in situ measurements of CO2/CH4 on UAVs that are likely less accurate in mole fractions but are more accurate in the position registration of the measurements.

P12 L3 – maybe ‘low’ shrubs – every plant is significant! P12 L14 – wind malfunction: pity.
Such things always happen, but knowing the wind might help in the interpretation of the results!

- Changed the word ‘insignificant’ to ‘low’

P12 L16 – the paper reports a single day’s experiments. This is fair enough as the paper is mostly about the method, but it would be nice to have a second trial. Maybe by the time the review process is complete it may be possible to add results from a second set of flights?

- Indeed, it would be nice to have a second trial; however, instead of a second validation experiments, we have later used the active AirCore system to quantify CH_4 emissions from a dairy farm and from a coal mining shaft.

P14 and earlier – all the figures in my print out are very fuzzy and hard to read. They look like low resolution screen grabs? Maybe it is my system but if possible could some attention be paid to making the figures sharp and clear? Fig 7 is especially fuzzy and hard to read.

- Yes, certainly. It was due to an issue with the conversion from word to PDF. The figures will be shown in high resolution in the final version.

P18 Section 3.3.2. Also P19 L17. This is really interesting and it is a pity the RH and 60m wind measurements are missing. Maybe the discussion could be extended? Well worth repeating the flights, and doing some back trajectory work.

- We would like to repeat the flights once we have obtained our own drone licenses. We have performed hysplit backward trajectories to confirm get an indication of whether the parcels of CO_2 could have come from the Eemshaven power plant.