Reply to reviewer #2

In line with the reply to reviewer #1, the reviewer comments will be depicted in black and the author reply in blue

This paper presents a comprehensive discussion of the deployment, calibration and performance of a dense array of low-cost sensors. The paper is interesting, shows that the sensors have potential for scientific application and is clearly written. The initial analyses explaining differences in local concentration patterns was very insightful and interesting. I enjoyed reading this paper. I recommend publication after clarification of some minor issues.

We would like to thank the reviewer for this positive feedback, and would like to address the minor issues in the next section.

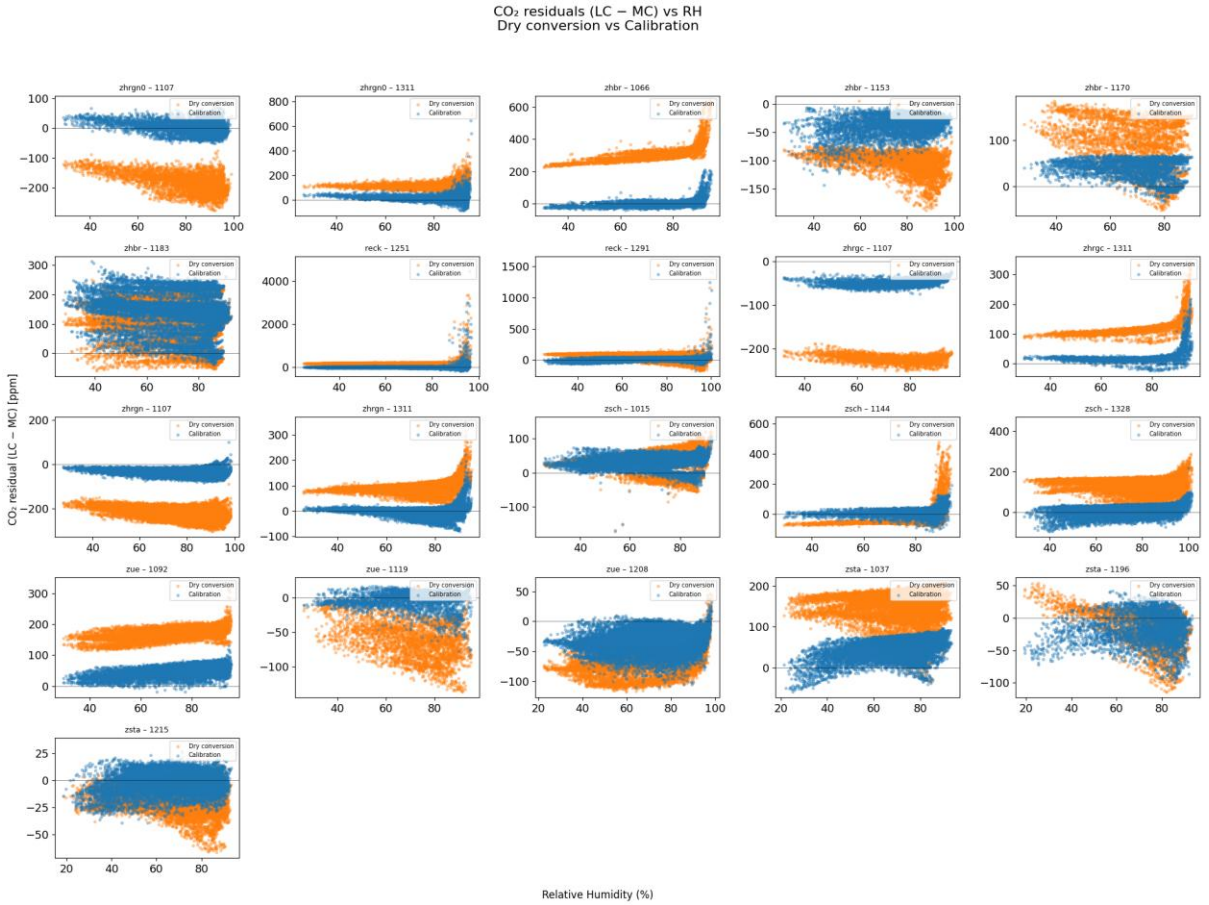
I found the discussion of humidity slightly confusing. Humidity has at least two effects. First water contributes to the total pressure requiring a correction if one is expressing a dry air mixing ratio. Second water affects the spectroscopy of CO2 in the NDIR sensor both through pressure broadening and through spectral interference. The authors begin by saying they make a correction to dry air. I was confused about when in the sequence of their analysis they make the correction to dry air and whether it makes any difference if they do that at the beginning or end of their analysis. I'm not challenging what the authors are doing, just hoping for some clearer procedural description.

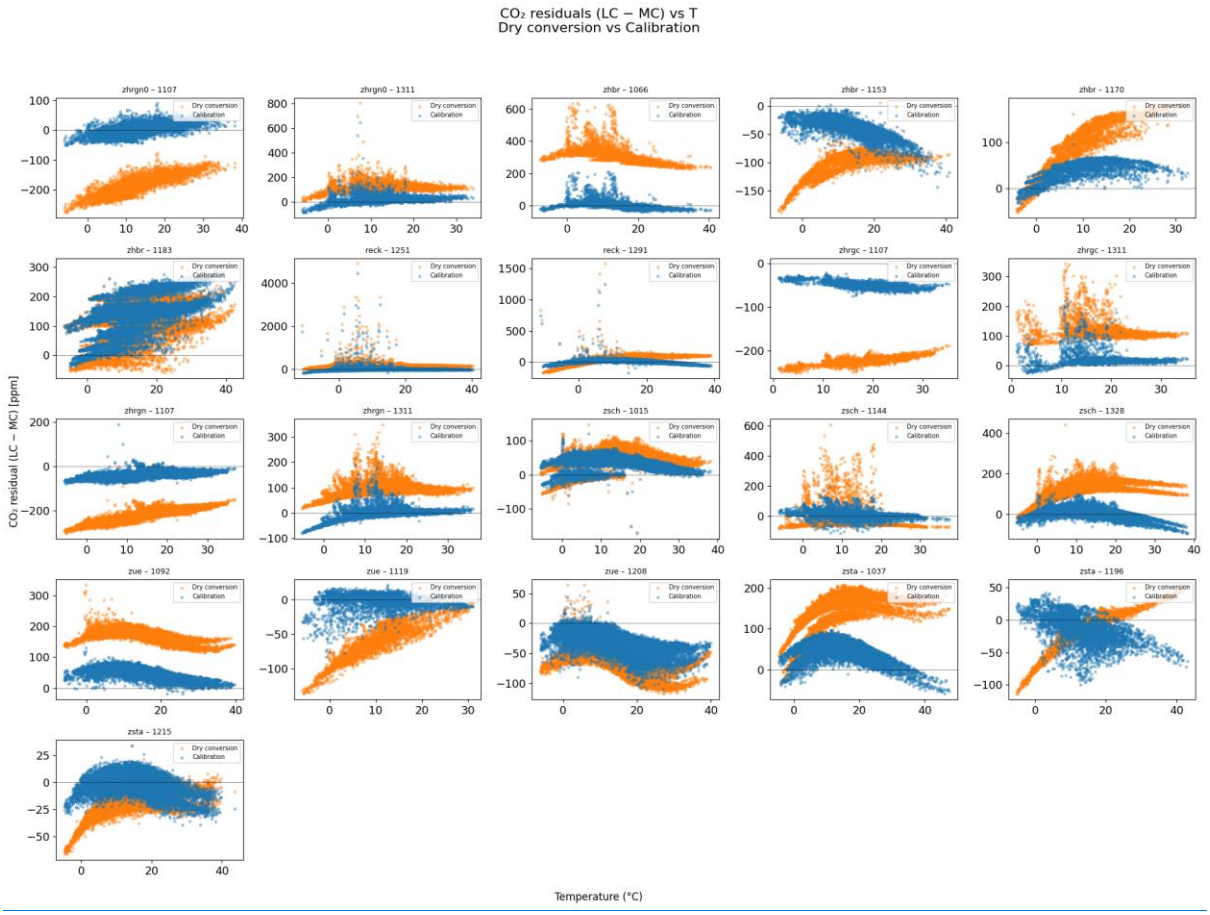
The conversion to dry air is done as a very first step, as described in section 2.4.1. We used the term “water dilution correction” for this, in line with the ZiCOS-M paper. However, this might be misleading, so we changed the title of the section to “conversion to dry air mole fraction”. The spectroscopic effect of humidity is tackled in section 2.4.2, by fitting the multi-linear model. The concentration first needs to be converted to dry air, before testing the sensitivity to RH.

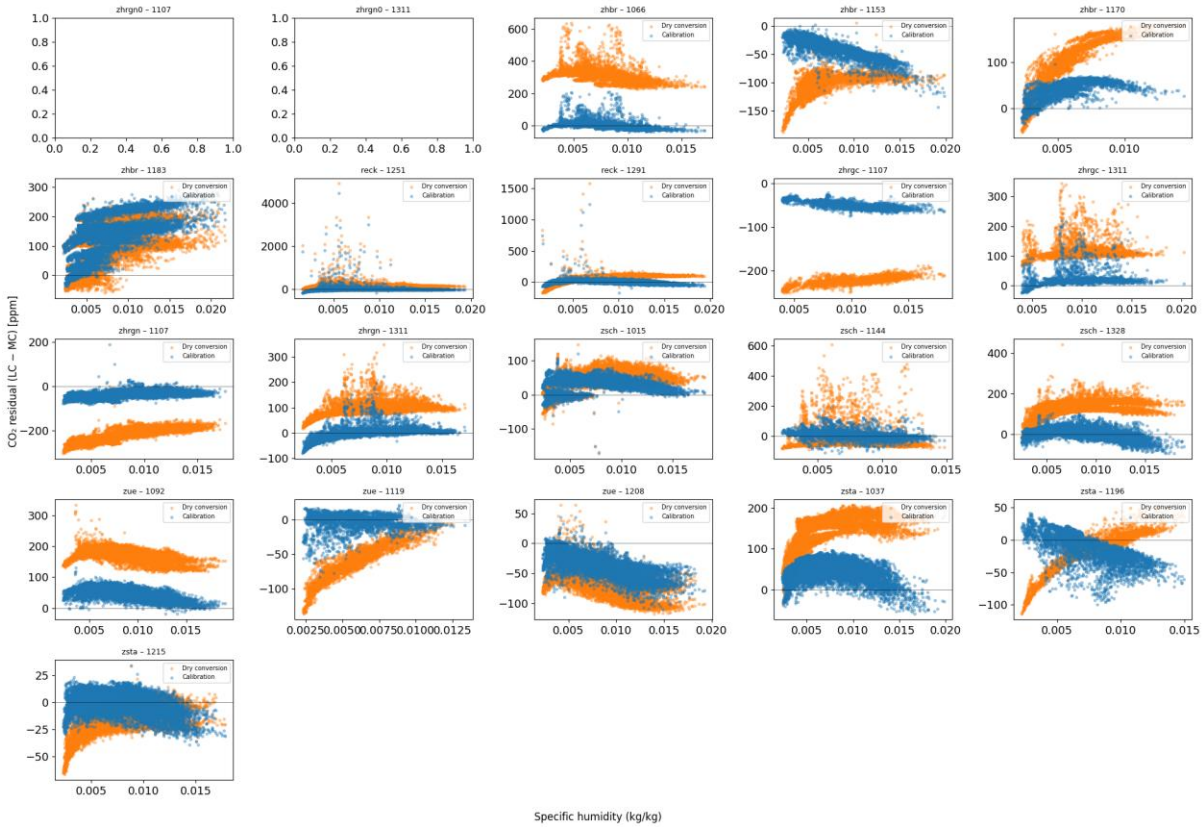
Second, is more subtle. A comparison of calibrated data to a reference should be flat if plotted against RH, absolute humidity or temperature. It's unclear to me if the authors checked their calibration in this way. A brief comment on the residuals of the low cost sensors vs. the reference along these coordinates would be helpful in evaluation of the data set.

We thank the reviewer for this sharp comment. The residual plots before and after calibration are added to this document. We see that after Calibration, the residual plots of most sensors are flat and close to zero. However, Random errors of the low-cost sensors still cause a large spread. Additionally, the hockey curve behaviour adressed in section 2.4.5 can be spotted for a few sensors (e.g. 1251, 1311, 1144) for RH, that indicates the large error of LC sensors for high RH. For T, some of the sensors still show some non-linear T dependency after calibration, which could not be captured by our linear model. Additionally, it should be noted that LC and MC do not measure at the

exact same location. MC sensors are mounted much higher to rooftops while LC sensors measure at street level. Differences in T and RH between these levels can also explain part of the residuals.




CO₂ residuals (LC − MC) vs T
Dry conversion vs Calibration
zhrgn0 – 1107
zhrgn0 – 1311
zhbr – 1066
zhbr – 1153
zhbr – 1170
zhbr – 1183
reck – 1251
reck – 1291
zhrgc – 1107
zhrgc – 1311
zhrgn – 1107
zhrgn – 1311
zsch – 1015
zsch – 1144
zsch – 1328
zue – 1092
zue – 1119
zue – 1208
zsta – 1037
zsta – 1196
zsta – 1215
Dry conversion
Calibration
CO₂ residual (LC − MC) [ppm]
Temperature (°C)


CO₂ residuals (LC − MC) vs q
Dry conversion vs Calibration
zhrgn0 – 1107
zhrgn0 – 1311
zhbr – 1066
zhbr – 1153
zhbr – 1170
zhbr – 1183
reck – 1251
reck – 1291
zhrgc – 1107
zhrgc – 1311
zhrgn – 1107
zhrgn – 1311
zsch – 1015
zsch – 1144
zsch – 1328
zue – 1092
zue – 1119
zue – 1208
zsta – 1037
zsta – 1196
zsta – 1215
Dry conversion
Calibration
CO₂ residual (LC − MC) [ppm]
Specific humidity (kg/kg)