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Interactive comment on "The measurement of atmospheric CO$_2$ at KMA/GAW regional stations, the characteristics, and comparisons with other East Asian sites" *by* Haeyoung Lee et al.

Anonymous Referee #1

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General comments

This paper presents the technical details and data from regional CO2 measurement stations within Korea and within the region. It is a welcome paper at a time when there is significant growth in regional carbon cycle monitoring and interest in the value of the data. In particular, because of Korea's location to the eastern seaboard of China, there could be great interest in these data sets going forward.

I commend the authors for presenting the full time series from their stations, indicating features attributable to technical and changes in the local environment. These lessons are valuable for others establishing regional monitoring stations.

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[Discussion paper]

I recommend publication after minor revisions as detailed below.

Specific comments

2.3.1 Calibration method

Fortnightly drift of +/-0.1ppm is significant. Have the authors assessment instrumental drift on shorter timescales? Also, does the calibration correction occur as a step-wise change fortnightly, or is it applied as a linear interpolation between successive calibrations?

P5, line 12: While CO_2 > 500ppm will be measured in room air, there are likely many instances (especially at AMY, which is most influenced by the local biosphere) when at night time biospheric respiration coupled to a low boundary layer lead to real CO_2 values above 500ppm. Although this may currently be difficult to interpret, model skill is improving and it seems a pity to flag all such data as invalid when it likely reflects an important component of the carbon cycle.

P7, line 2: replace 'Similarity' with 'Similarly'

P7, line 7: I suggest 'Here, U_lab has the same value as the . . .'

P7, line 11: I suggest, 'In future, quote uncertainties could be greater due to including more error sources. Repeatability and reproducibility may become more precise with improvements in technologies and methods.'

P9, line 10: I suggest, '. . .3.9ppm) and CO_2 increased monotonically during the after-noon.'

P9, line 34: I find mention of the growth rate at RYO during the 1990s a distraction. I suggest deleting it unless it is discussed further.

P10, line 3: I suggest, 'Since CO_2 is a long-lived atmospheric species, the growth rates should be similar between stations in the same region, even if they are subject to different combinations of anthropogenic and biogenic fluxes.' I certainly wouldn't use

the phrase 'those scales' as they should all be on the same mixing ration scale.

P10, line 14, I suggest replacing 'unstable' with 'strong, highly localised'

P10, line 25, I suggest deleting 'On the other hand' and having 'On-going comparisons of measurements at co-located sites and for the same species, such as between discrete samples and continuous measurements (Masarie et al, 2001) are a valuable means to maintain data quality and identify sampling issues rapidly.

Figure 8: It is striking that the growth rate for ULD is so low in 2014, yet it is not commented on in the text. Do the authors have any idea what is responsible for that anomalous year at ULD? Discussion of it in the text would be very interesting.

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Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-886, 2018.