

Dear Ye Yuan and co-authors,

Thank-you for the work that you have undertaken to address the reviewers comments on your manuscript. Overall I think the manuscript is now close to being suitable for publication. There are some occasions where you have given a reply to the reviewer comment but do not appear to have captured that information sufficiently in the revised manuscript. I have listed these below. In reading the manuscript again, I would also like to recommend the following technical corrections. The page and line numbers refer to the version of the manuscript which includes the tracked changes.

P3, line 8: replace 'combing' with 'combining'

P4, line 25: perhaps replace 'against' with 'to prevent'

P4, line 25: Suggest replace the sentence starting 'The inlet ...' with 'The inlet was mounted on a small mast (approximately 4 m high) on the top of the laboratory building ...'

P5, line 3: Replace 'the mast ends' with 'the mast height is'

P5, line 13-14: Perhaps include the sentence from your reply to reviewer 2 (4/5-6): 'For continuous quality assurance the GC was checked daily for flows, retention times, gas pressures, and the structure of chromatograms.' somewhere in this paragraph.

P5, line 13: Replace 'pollution list' with 'logged list of local pollution from working activities in the Research Station.'

P5, line 18-19: Suggest replacing 'a quasi-continuously measured second target' with 'a second target (measured approximately 25 times per day)'

P6, line 2-3: You mention the different calibration scales here, but the only information about which scale is used for which time period is in the supplementary material (Table S1). I think it might be useful to move this table back into the manuscript, perhaps with a sentence at the end of section 2.2 such as 'The different instruments and calibration scales used at each location are summarised in Table 1.' For ZSF, perhaps you should be more explicit about the HP not being available in 2012-2013, and also that the CDRS has run for longer than 2012-2013, but those are the only years used in this study. This information could be added as table footnotes.

P6, line 7: Add '(Table 1)' after 'in the standards', assuming the instrument table is moved back to the main manuscript, otherwise refer to Table S1.

P6, line 13-15: Suggest replace sentence starting 'Due to ..' with 'Since we have insufficient information to determine a physically derived correction to the ZPT CO₂ data, an offset adjustment was made for further analyses based on the offsets in data computed in the overlapping years.'

P7, line 17: Delete 'results' before 'represent'.

P7, line 30: Suggest adding '(without ADVS selection)' after 'are calculated'

P11, line 21: Check table numbering if move table 1 back from supplement.

P12, line 19 and 20: To be consistent, you might want to change 'amplitude' to 'difference' in these sentences.

P12, last paragraph: Reviewer 1 suggests that one factor in differences in seasonal amplitude between Mount Zugspitze locations is the different measurement time periods and the possibility

that seasonal amplitude has grown over time. This is probably worth noting in this paragraph, alongside the discussion of different air-mass transport to the different locations.

P13, line 13: Suggest adding 'original' before 'validated' and 'only' before '4634'.

P16, line 2: Add 'composite' before 'CO2 measurement record'

Figure 2 caption: For panel (a) the caption needs to state that grey and black are used for the unselected and selected results.

Figure 3: Please consider whether this figure would be easier to understand if the percentages were calculated relative to the number of data points available for that hour, rather than to the total number of data. This would presumably give percentages that would average (rather than sum) to the number quoted in Sec 3.1.

Supplement, p2, line 16: Should be Table S1 not Table S2 (or Table 1) if this is moved into the paper as suggested above.

Supplement, p7, line 4: If move table, replace 'Table S1' with 'Table 1'

Supplement, Figure S7: You seem to have some odd behaviour at the start of the ZPT_ADVS timeseries with very low CO₂ concentrations. How has this occurred and will it have impacted any of your analysis?

Regards,

Rachel Law, rachel.law@csiro.au