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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of in situ measurements of atmospheric carbon monoxide at Mount Waliguan, China" *by* F. Zhang et al.

Anonymous Referee #2

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General comments

In the paper "Evaluation of in situ measurements of atmospheric carbon monoxide at Mount Waliguan, China", Zhang et al. present 3 years of quasi-continuous measurements of carbon monoxide. A large part of the paper focuses on the methods that were used to assure the quality of the data set. This subject is treated with due care and its description will be useful to others performing such measurements. The second part of the paper is dedicated to source apportionment of the air masses arriving at the measurement station, using statistical analysis of backward trajectories. This is important for validation of the site as a WMO/GAW global baseline station. I agree with the first reviewer regarding the "global background" and "local baseline" considerations. Overall, the quality of the paper is good. Still, before publication in ACP there are some

points that must be addressed / corrected.

Specific comments and technical corrections

When describing the station, some more details would be desirable, including information on the beginning of CO measurements at this location, what else is measured there, and what is the reason for not presenting data more recent than June 2007.

Page 1939: affiliations – "Zuerich (or Zürich)", not "Zurich"

Page 1941, Line 1 (1941/11): using "high frequency" is not justified – replace by "quasi-continuous", which is used throughout the text.

1941/11: "affected", instead of "effected"

1941/17 and throughout the text: wrong usage of capital letters when describing cardinal directions (North, West, . . .) – should be written in small letters.

1941/23: do the authors mean "The background. . .", and not "These background. . ."?

1942/10: it would read better ". . .methane and other hydrocarbons. . ."

1942/21: should be ". . .(WMO, 2010). . ."

1943/2: correct "Junfraujoch"

1943/section 2.2.1: There is no figure presenting the analytical setup. If the technical setup is published elsewhere, please refer to it here. Otherwise, an overview schematic of the system should be presented here to improve clarity and complete the information.

1943/24;1944/3: it is unclear to what 5 L min-1 and 1 L min-1 are referring to. Was the flow rate through the Dekabon tube 5 or 1 L min-1? Please clarify.

1944/4: cryogenic(-ally) actually refers to temperatures below $\sim$ -150°C; instead ". . .filter and dried to. . . . . .using a. . .".

1944/9:"Molecular Sieve 5 A. . ." correct the unit to Å

1944/11: as described here, it may be unclear for the reader how the oxidation/reduction takes place – rephrasing/adding a few words here would benefit the clarity.

1944/15-18: I have trouble understanding this sentence – from the range of the gases, it seems that you are referring to working secondary standards. Please clarify/rephrase – a figure would be helpful, too.

1944/26:". . .the instrument linearity. . .": as correctly stated earlier in the text, the used instrument has a non-linear response – I suggest using ". . .instrument response curve. . ." or similar.

1945/9: ". . .six primary gases. . .": as these are the gases used for the calibration and considering line 11 on the same page, the correct term would be "working standards" or "working secondary standards". On page 1943/22, for example, ". . .standard tanks. . ." is used – check for consistency throughout the text (there are several places).

1946/27- : Could you please shortly elaborate on the influence of non-inclusion of some Sx gases in re-calibrations on the precision of measurements for CO mixing ratio values beyond the calibration range of the WCC cylinders?

1948/6: remove "of" after "a.s.l.". It is not clearly said which data set was used (presumably Non-dispersive IR). Where does it come from (downloaded from WDCGG web page?).

1949/4: "pollution measurements" – remove "pollution"; one measures ambient air – pollution or not.

1949/25: delete "oil" in "petroleum oil".

1950/21: rephrase ". . .due to agricultural biomass burning (Yan et al., 2006) and growing fossil fuel combustion."

1951/11: adding these "hot spots" on the maps would help the authors to better demonstrate their results and would increase the value of the paper.

1953/7:". . .background CO mixing ratio shows. . ."

1953/10: ". . .in winter background CO between the two sites, when at JFJ the CO mixing ratio is 20-40 ppb higher, reflect. . ."

1953/11: ". . .greater wintertime OH concentration/mixing ratio/quantity/. . ."

Table 1: as noted before, the use of "primary" should be reserved to standards that define the scale. Therefore better use "working secondary standards".

General comment on Figures:

Format of axes labels should be improved (put only units in parentheses or use "CO (text) [ppb]"). Homogenize the labeling – e.g. for CO mixing ratios CO mixing ratios (ppb), Ambient CO (ppb), etc. is used.

Fig. 1: Adding a map inset showing the global location of the site would be helpful. The overall quality of the map should be improved (lines/borders missing).

Fig. 5: identical to Fig. 3, the correct Fig. 5 must be provided.

Fig. 8: what are the two black dots? I cannot see a black cross in the figure as you mention it in the caption.

Fig. 9: I suggest that all numbers (trajectory clusters) are positioned vertically to improve legibility.

Fig. 10: add the highest possible value for W (1) in the caption/figure.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 1939, 2011.