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Atmospheric Measurement Techniques Discussions

Interactive comment on "Greenhouse gas observations from Cabauw Tall Tower (1992–2010)" *by* A. T. Vermeulen et al.

A. T. Vermeulen et al.

a.vermeulen@ecn.nl

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- Reply text from the authors is indicated by a hyphen "-" at the start of a paragraph. All other paragraphs stem from the reviewer text

- First of all we would like to thank Dr. Arlyn Andrews for her review of the article and her useful corrections and suggestions. We agree with almost all of the corrections and remarks and changed the texts and figures where appropriate, according to the remarks in the review. All the reviewer issues not repeated in this reply have been fully incorporated in the revised version of the article.

Some general comments:

The measurements are not really concentration measurements, but rather dry air mole fraction or mixing ratio measurements. This should be clarified early on.

- In the introduction of section 3, last paragraph, we write : "In this paper we will report all concentrations of gases as molar mixing ratios in dry air with units ppm, ppb or ppt. More details on the instruments can be found in Tables 1-3 and Figs. 3-7.

There are lots of small grammatical errors and inconsistencies between figure captions and text. Also, the tables and figures are cited out of order.

- In the revised version of the article we have corrected all the figure and table numbering issues by using the automatic numbering mechanisms of (La)TeX. We understand that this numbering issue must have caused a negative overall impression of the article and a lot of confusion for the reviewers and readers. We therefore appreciate the efforts of the reviewers to still produce a consistent review despite this major hurdle.

The “trend” analysis seems overly complicated. I think it is perhaps better to just use afternoon averages for trend and seasonal cycle analysis. In any case, more clarification is needed about which trimming method was applied to which species.

- We clarified the trimming methods used in the text and in the figure captions

Figure axis labels & legends are too small! I had to blow them up to >200% to read in some cases.

- Most figures in this revised version have been enlarged and cropped for the sake of better readibility.

Specific comments:

Abstract: Pg 4170 line 15: Is the region around Cabauw tower really one of the most intensive and complex source areas of greenhouse gases in the world? It is not obvious to me that it would be any more complicated than many other sites.

- This region of Europe belongs to the most densely populated areas of the world.

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This combined with the large economic activity as main port to Europe, in combination with intensive agriculture, a high density of feedstocks and resulting emissions of CO2 en non-CO2 greenhouse gases (absolute, per capita and per unit area) and a very heterogeneous land use pattern seem to justify our text.

Pg 4171 line 5: sentence with “that is and will be used” is confusing.

- We replaced this sentence with: will be useful

Pg 4173 and Figure 2: It would be useful to show daytime and nighttime footprints separately. Perhaps point out that many global and continental-scale inverse modeling studies to date do not use nighttime data.

- The difference between the patterns for nighttime, daytime and alltime footprints for the 200m level are not that large. Daytime footprints for the 20m level are similar in pattern to that of the 200m level as concentrations are relatively well mixed during these hours. The shown alltime footprint for the 20m level is a bit less local than the nighttime footprint. We hope that with the next generation of regional inversion studies also the full continuous observations will be utilized in order to use all information enclosed in the atmospheric signal for the greenhouse, enabling to resolve both the local (scale 10-100 km), regional (100-1000km) and continental and global scale fluxes from the network of observing sites.

Section 3.1.1: No mention of use of “targets” during this period. Were they used in period A? If not, how was the precision estimate in Table 2 determined. Also, no mention of whether there were differences in humidity between samples and standards during this period. Short-term precision of 0.5 ppm can be estimated from the span gas measurements, but what about drift on timescales of hours?

- The precision estimate in Table 2 was estimated from the daily span gas measurement before correction. Both samples and standards were in period A conditioned to the same dewpoint of 5 degree C. We adjusted the revised text to clarify this.

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Interactive Comment

Pg 4182 line 20: suggest: " a new set of equipment was installed at Cabauw"

- The revised manuscript has been changed accordingly

Pg 4184: I read lines 5-12 to indicate that two targets are sampled every 30 minutes. Is that correct? If not, then clarification is needed.

- correct

Pg 4190 line 21: Replace "between" with "among" to indicate that more than 2 labs were involved. Also, when possible, I prefer the word "comparison" rather than "inter-comparison".

- obsolete after changes in this section

Pg 4190 last paragraph: Are the numbers given after the correction for the problems identified with the cucumber cylinders? It would be interesting to elaborate more on the nature of the problems that were identified, since this could be instructive to others attempting to make high accuracy GHG measurements.

- The problems had to do with corrections in the concentration scale at the central lab after the assignment of the values to the working standards. These changes did not propogate into new assigned values before the first cucumber comparison were carried out. After detection of the problems and the reassignment of the working standard concentrations the differences were reduced. A paper reporting the results of the cucumber comparisons in being planned.

Pg 4194: Why not use median statistics to minimize impact of extreme events described at end of section 4.2.

- As described before we are also interested in the information from local to regional sources on top of the background signal for our latitude. In the further analyses we use the trimming methods to filter out the extreme events.

Pg 4195: I have no idea what is meant by the term Omega blockade.

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- We enhanced the text here in order to clarify the term and its importance for the synoptical variations observed

Figure 8: Caption does not seem to correspond to colors on plot.

- We corrected this caption

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4169, 2010.