

***Interactive comment on* “In-situ measurements of oxygen, carbon monoxide and greenhouse gases from Ochsenkopf tall tower in Germany” by R. L. Thompson et al.**

Anonymous Referee #1

Received and published: 12 May 2009

Review of the manuscript " In-situ measurements of oxygen, carbon monoxide and greenhouse gases from Ochsenkopf tall tower in Germany"submitted by Thompson et al.

General comments:

The paper presents, describes and discusses in-situ measurements of a suite of atmospheric constituents such as oxygen, carbon monoxide and several greenhouse gases recorded at Ochsenkopf tall tower in Germany. Despite its shortness the record is valuable in many scientific aspects such as footprint determination, characterization of seasonal and diurnal amplitudes, continental offsets compared to marine background

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levels etc. The measuring container used was set-up such that an utmost precision and reproducibility for any measured species is achieved. In addition those in-situ determinations are backed up with frequent flask samples measured at the high precision laboratory MPI-BGC Jena. The paper is well structured, balanced in presenting and discussing the records sequentially parameter by parameter. It is nicely written and therefore easy to follow in terms of the writing style as well as their argumentation. I recommend to publish it with minor modifications.

Specific comments:

Page 1253, line 5: You mention that the long residence time has no measurable influence on the GC-measurements. Nevertheless, there are plans to change it. Why? Give the reader a motivation for this plan.

Page 1253, line 14 to 25: Has the pump model KNF N86 been tested for potential fractionation of oxygen. If not, have you any idea how large potential fractionations might be and to which processes they could be assigned?

Page 1257, line 17: What means zero gas. What is the composition of this gas standard? Zero CO₂, zero O₂ or what? Please specify.

Page 1260, line 14ff: It is to clear to the reviewer whether the flask intake line is shown in Figure 2 or not. Is the drying of flasks done as the in-situ measurements using the same setup, or is a special device used?

Page 1262, line 20ff: trimmed values: This means that only 50% of the values are actually included? Are the daily means calculated using all data points or using only 50% of the data points. The reviewer's concern is that with an asymmetric distribution of high and low values a shift of the mean could be introduced. Asymmetric distribution may occur due to diurnal vertical mixing changes and diurnal source/sink fluxes.

Page 1263, line 20: cite Sirignano et al., Atmos. Chem. Phys. Discuss., 8, 20113-20154, 2008,

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Page 1263, line 24ff: The different equilibration times of oxygen and carbon dioxide helps explaining the higher amplitude for oxygen than expected from terrestrial exchange only. However, if this would be the only reason, the reviewer would expect a good phasing between the APO (calculated from the Ochsenkopf region) and the Shetland Island oxygen record which should mainly be a marine signal. Additionally, there is a small seasonal cycle of the oxidation ratio (O_2/CO_2) of fossil fuel combustion emissions [Sirignano et al.,2008], which should not be neglected, as well as a seasonality of fossil fuel emission fluxes, though small as mentioned by the authors.

Page 1264, line 17: delete for

Page 1264, line 19: I do not agree with this statement since from the oxygen data (Figure 3b) the reviewer reads a linear trend which is double as much as the authors state (> -30 permeg/yr than the stated -16.3 permeg/yr). Therefore, it would correspond to 25% of the seasonal amplitude and not only to 10% of it as stated.

Page 1265, line 10ff: Have you looked into the potential of stable isotope analyses. Could such analyses be of help in demonstrating that indeed methane emissions from the high northern latitudes occurred?

Page 1266, line 17ff: The reviewer needs additional information to accept this argumentation of air mixing influences for specifically, or even exclusively for continental sites.

Page 1266, line 23ff: Trend number should be given with assigned uncertainties for any trend calculations.

Page 1271, line 5 to 18: The reviewer suggests to look more closely to the ratio of excess O_2 to excess CO_2 since this should be an indicator of whether the main signal observed during this synoptic event is indeed due to fossil fuel combustion from the Ruhr area.

Page 1272, line 18: Check trend in oxygen again.

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Page 1272, line 27: Have you a proof of those near-field sources?

Table 2: There is significantly lower number of samples for oxygen compared to other parameters, which cannot be explained solely by the later start of high precision oxygen measurements. Were some samples excluded from those calculations? If yes, you should state it.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1247, 2009.

AMTD

2, C118–C121, 2009

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