

## ***Interactive comment on “Carbon monoxide observations from ground stations in France and Europe and long trends in the free troposphere” by A. Chevalier et al.***

### **Anonymous Referee #1**

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The authors combine a comprehensive set of multi-year CO measurements collected by surface stations, aircrafts and satellite to look at trends in the atmospheric CO load over Europe from the 1980s and 1990s to present. Their analysis shows that surface stations at high elevation can be considered as representative for background concentrations. The long-term surface measurements indicate a negative trend over Europe for the January–April season. In summertime no trend was found and it is suggested that photochemistry is strong enough during the summertime to counterbalance changes in the CO input into the atmosphere. The negative trend is thought to be related to a decrease in CO emissions over Europe.

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The authors have done a great job in putting together and analyzing a large set of CO measurements from various platforms. Their analysis is generally sound, but some of the author's conclusions are rather weak in my eyes. More specifics can be found below.

The writing needs to be improved throughout the paper and I suggest having a native English speaker proofread the manuscript.

Specific comments:

Abstract: "France and Europe" sounds awkward.

Page 3320, line 20: I believe the observatory Zugspitze is German, not Austrian?

Section 2.2.: Why did you use only MOZAIC data over Frankfurt? Wouldn't there be also sufficient profiles available for other major airports, e.g. Paris?

Page 3322, line 20: Also JUN, ZSP and PDM data can be compared to MOPITT data only in a qualitative sense.

Page 3324, line 27-30: "seasonal variations are considerable throughout the year". What does this mean?

Page 3325, line 1-4: Do you have a reference for this statement?

Page 3325, line 4ff: What point do you try to make in this paragraph that has not been shown before?

Page 3326, line 2 ff and Figure 7: To me, it seems the only clear feature in this graphs is coming from the MOZAIC data, the surface data are all over the place.

Section 4: Why are you not looking at long-term trends for Jungfrauoch and Hohenpeissenberg?

Page 3328, line 14 and Figure 10: I don't think you can talk about a trend or a "definite conclusion" by using three data points. The difference between the years 1982, 1983

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and 2005 might be explained by inter-annual variability alone. All you can say is that you can establish a trend at ZSP, and that the few measurements at PDM support these findings.

Page 3329, line 19 ff: It is a very interesting finding that changes in emissions only impact winter/early spring and that the oxidation capacity of the atmosphere can counteract according changes in summertime. But I am not entirely convinced of this from your results. On page 3325 and 3327 you mention that that the boundary layer and local effects impact the surface sites more in summer than in winter. Also biomass burning will impact summertime values and has a large year-to-year variability. Could it be that the variability in summertime is masking any trends?

Page 3329, line 26 ff and Figure 12: Do you draw the same conclusions when you separate MOPITT data by season?

Page 3330, line 15 and Figure 13: This is a very rough correlation analysis. Not all fire regions will affect all stations; you would have to consider transport patterns here.

Page 3331, line 19: What are the CLEAR indications? You mentioned on page 3322 that PDM and ZSP are representative of background and large-scale transport, yet you relate the trends in CO concentrations at these sites to local emissions?

I recommend a larger font size for at least Figures 3, 4, 5, 7, 9, 10, and 11.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 3313, 2008.

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