

Interactive comment on “Interannual variability of ozone and carbon monoxide at the Whistler high elevation site: 2002–2006” by A. M. Macdonald et al.

Anonymous Referee #1

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General comments:

The authors investigated the influence of trans-Pacific transport and North American forest fires on O₃ and CO levels at a high elevation site in British Columbia using continuous measurement data during the time period of March 2002 – December 2006. The paper addressed relevant scientific questions within the scope of ACP, presented a valuable data set, and reached a few interesting conclusions with regard the impact of fire emissions on the ambient O₃ and CO levels at a remote, high elevation site. The paper was well written, and the overall presentation was well structured. The authors need to be careful when referring to tables and figures, as the numbers and terms they

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used in the text sometimes mismatched what was shown in their tables and figures. Cited literature needs to be updated. At times the authors seemed to cite references randomly, not necessarily most relevant to points of discussion. Further, there are a few issues that need to be addressed before publication.

Specific comments:

Line 25, page 17624 – line 7, page 17625: the NASA Tropospheric Chemistry Program (formerly GTE) has been reporting on the impact of regional to global transport on the chemical composition in the free troposphere since the early 1980s. In recent years much research has been conducted to understand such impact using satellite retrievals. This review paragraph needs to be expanded and updated.

Line 27, page 17629 – line 2, page 17630: The decrease seemed to be over 08 – 10 PST in Figure 3a. The authors might want to be specific about the source(s) of lower O₃ levels which decreased the nighttime mixing ratios at the site. After 10 PST what process(es) possibly contributed to the increase besides that 1 ppbv due to photochemical production?

Line 7, page 17630: The fall pattern looks different from the spring and summer ones based on what Fig. 3a shows. In the fall months nighttime O₃ mixing ratios appeared to be higher than the daytime levels by ~ 1 ppbv with the daily maximum at around 07 PST. Please explain what might have contributed to that.

Lines 1-2, page 17631: In Table 2, the “summer” values ranged over 29 – 43 ppbv, not 32-40 ppbv as the authors stated, assuming the summer the authors defined includes JJA, and the annual median ranged over 41 – 43 ppbv, not 40 – 43 ppbv.

Line 25, page 17631: I wouldn't call what is shown in Figure 5a “histograms”.

Lines 2-3, page 17633: Relative to what are mixing ratios in September-October 2002 and April-August 2003 “21%” and “25%” higher, respectively?

Lines 24-28, page 17638: The authors might want to consider comparing their slope

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values quantitatively with recent studies on O₃-CO correlation in fire plumes. I recall Parrish et al. (1998) did the work for the North Atlantic region, and they were discussing the O₃-CO relationship in the North American outflow. What numbers did they get? Please be quantitative. But why would the authors compare their numbers with that study in the context of fire influence?

Line 9, page 17640: Were O₃ and CO really negatively correlated? There seemed to be a phase lag between the O₃ and CO spikes. I saw the CO peak led by about two days. What if the authors correlated the two gases with that phase lag accounted for? I suspect it'd be a positive correlation. Thus, I think here one needs to point out that in some cases there were not phase lags in occurrence of O₃ and CO enhancements due to fires, while other times there were such phase lags; it'd be edifying to find out what may have contributed to that.

Line 27, page 17640: See the previous comment regarding the negative O₃-CO correlation.

Figures:

Figure 7: Labels for the color bars are too small, or of too coarse resolution to be readable in my printout.

Figure 8 caption: Shouldn't "Fig. 12" be "Fig. 6"?

Figure 10 caption: Did the authors mean to say "minus" instead of "less" in (a)? In (b) and (c), I suspect "Fig. 11a" should be "Fig. 10a", and in (d) "11c" should be "10c".

Figure 13: What are the color schemes for the maps? They are so small that I don't know what I should look for in them.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 17621, 2011.