

General Comments:

This paper examines recent trends in baseline carbon monoxide (CO) and ozone (O₃) in the northeast US region using measurements at seven rural sites in New England and upstate New York. The paper documents significant decreasing trends in CO while showing that there was no significant long-term trend in O₃. The authors examine in great detail the causes for these results including the impacts of changes in local and global anthropogenic emissions, wildfires and the impacts of meteorological factors such as long-range transport, clouds, temperature, humidity and stratospheric intrusions, and the relationship of these factors to climate indices including the North Atlantic Oscillation (NAS) and Arctic Oscillation (AO). Their scientific arguments are sound and because they can be used to hypothesize about the combined impacts on air quality of future changes to anthropogenic emissions and atmospheric circulation changes resulting from climate change they are highly relevant to current environmental concerns.

There are a couple scientific issues detailed in the Specific Comments section and a number of corrections listed in the Technical Corrections section that should be addressed. However, these do not detract from the overall message of the paper. Therefore I recommend that the paper be published in Atmospheric Chemistry and Physics after these minor revisions are completed.

Specific Comments:

Why was the daily maximum solar radiation flux at Thompson Farm so low in spring 2002 (Figures 3 and 9b)? The NAO was positive but it was also positive in other years (e.g. 2004) without the solar radiation flux being so low.

In Section 3.3.3 the authors show that the NAO does not play a significant role in the interannual variability of baseline CO. Later in the section the authors suggest, citing other studies, that the circulation pattern associated with the positive NAO may work to lower baseline O₃ in the northeast US by facilitating continental export. However, wouldn't those same mechanisms also facilitate export of CO limiting its buildup? Do these findings suggest that the impact of continental export on O₃ is small compared to the impacts of decreased stratospheric intrusions and solar radiation flux?

Technical Corrections:

Page 27254, Line 1:

You should define baseline CO and O₃ at the beginning of the abstract to inform the reader that it is not exactly the same as the background. The first sentence of the abstract could be something like "We define a baseline CO as the lowest 20th percentile of mixing ratios and a baseline O₃ as that corresponding to the baseline CO."

Page 27255, Line 2:

Add a period after US.

Page 27255 starting at Line 13:

Consider swapping the order of the first two paragraphs in the introduction to be consistent with the title and the abstract (i.e. CO is discussed before O₃).

Page 27256, Lines 25 -26:

Change

“could be transported downwind and subsequently affect the baseline CO and O₃ levels there”

to

“could affect the baseline CO and O₃ levels downwind.”

Page 27257, Line 3:

Consider mentioning the new stricter EPA standards governing O₃ exceedances.

Page 27257, Line 5:

Change “mid-latitudes” to “mid-latitude regions”.

Page 27257, Lines 5 – 8:

Consider combining the two sentences into one with the clause “and no consistent trends” after “Asia” to connect the two thoughts. The reference list should then be moved to the end of the new sentence.

Page 27257, Lines 28 -29:

This is a bit confusing since you start the sentence with “Most studies” but only list two and “episode” is singular.

Page 27258, Line2:

Change after “O₃” to “, and both of these focused on ten years of observations from the 1990s.”

Page 27258, Line 3:

Change “More” to “Thus more”.

Page 27258, Line 16:

Add a period after “US”.

Page 27258, Line 28:

Insert “with” before “less”.

Page 27259, Line 9:

Hegarty et al., 2007 is the correct reference.

Page 27261, Line 21:

Add “and” before “potential”.

Page 27262, Line 13:

The meaning of the clause “the center of a cyclone was obtained” seems unclear in this context. Do you mean that if more than one local minimum is found the cyclone position is designated as the center point of the local minima?

Page 27264 Lines 25 – 30, and Page 27296, Table 2:

I think the numbers in the “Annual CO” column in Table 2 have the wrong sign (positive) except for CS which should be positive. Please check and correct where necessary.

Also please check the “Annual O₃” column. Based on the seasonal trends it looks like some of the annual trend should be negative but they are all listed as positive.

Page 27275, Line 7:

Add a period after “US” and capitalize “of”.

Page 27276, Line 5:

Change “ultimate” to “ultimately”.

Page 27278, Line 14:

Change “known as the positive phase of NAO” to “which is indicative of the positive phase of the NAQ”.

Page 27281, Lines 18 - 20:

On October 1, 2015 the EPA lowered the 8-hour average O₃ standard to 70 ppbv (<http://www3.epa.gov/ozonepollution/pdfs/20151001overviewfs.pdf>). Please update this sentence.