**Atmospheric
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Discussions**

Interactive
Comment

Interactive comment on "Summertime cyclones over the Great Lakes Storm Track from 1860–2100: variability, trends, and association with ozone pollution" *by* A. J. Turner et al.

Anonymous Referee #1

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This manuscript examines the relationship between high ozone episodes and mid-latitude cyclones in the Northeastern United States using simulations from a global coupled chemistry-climate model. Results from several different types of simulations (Pre-industrial Control, Historical, and Future) are examined. It is found that there is a relationship between summertime cyclones and high-O3 events in the model, and that the frequency of cyclones decreases in projections for the 21st century. However, the change in frequency explains less than 10% of the variability in high-O3 events.

These are important results and of interest to readers of ACP. The manuscript is well written and is acceptable for publication in its current form.

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I have a few suggestions for the authors to consider.

Specific Comments

1. The natural variability of cyclones is examined in the Pre-Industrial run, but there is no analysis of ozone (or high ozone events). Wouldn't this long simulation give a more robust definition of the relationship (correlation) between high-O3 events and cyclones? This would require redefining high-O3 events, but this can be done as for the historical simulation. I think a version of fig 4 showing time series of frequency O3 events, together with scatter plot of cyclones versus O3 events (e.g. Fig 8c) would be helpful additions to the paper.

2. The main conclusions is that the sensitivity of high-O3 to cyclones does not explain much of the variability. This then raised the question of what are the factors that determine the variability. I think there needs to be some discussion / speculation of the possibly important factors.

3. I understand the desire to use a comprehensive storm tracking algorithm, but how dependent are the results to this. Would the results be any different if you had used a simpler scheme (e.g., just use the statistics from first part of algorithm before tracking)? I am not sure how much is involved to do this, but it would be useful to know if tracking is really needed (especially as 6 holy data is not always available).

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 21679, 2012.

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