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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The influence of the North Atlantic Oscillation and El Niño–Southern Oscillation on mean and extreme values of column ozone over the United States" *by* I. Petropavlovskikh et al.

Anonymous Referee #1

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This is the review of "The influence of the North Atlantic Oscillation and El Niño–Southern Oscillation on mean and extreme values of column ozone over the United States" by Petropavlovskikh et al..

The paper discusses the temporal evolution of the total column ozone (TOC) over United States as observed by Dobson spectrophotometers at five measurement sites since the 1960s. Further the authors investigate the influence of the NAO and ENSO modes on TOC. The influence of the ozone extreme events is also analyzed and sub-

tracted from the temporal trends. The material is of interest for the readership for Atmos. Chem. Phys.. Nevertheless, the manuscript needs several clarifications and adjustments as indicated below.

Major comments: - Section 4.1 is not clear enough. The authors state that NAO and NIÑO3.4 indexes are correlated with TOC, but no evidences are presented in the article. Only visual correlations are mentioned. What about statistical correlation? Furthermore, Figs. 3 and 4 are difficult to read. Please, clarify the y-axes for ELOs and EHOs.

- A deeper discussion should be performed in section 4.3. The authors attribute to the large spatial distance the absence of fingerprints during NAO and ENSO events at the five sites. I partially agree with the explanation of regional effects. As Figure 6 is, practically, limited to certain months, I think more analysis should be performed for particular events. Is there any difference (meteorological, synoptic,...) between those events discernible at the five sites and those only visible in northern sites or the eastern sites,...?? In this sense, are these differences in line with the results shown of Table 3? Some sites present good relationships in winter or spring for the extreme influence, are these similarities translated to the fingerprints during certain events?

- I miss more comments about the interesting topic of double tropopauses (e.g., Randel et al. 2007; Pan et al. 2009). Previous studies have shown that intrusions of subtropical air above the extratropical tropopause produce a decrease in the ozone levels (e.g., Castanheira et al. 2012), and being more frequent with NAO positive phases (e.g., Mateos et al., 2014). It is not necessary a complete analysis of these events (maybe, it is beyond the aims of the article), but these events should be more clearly mentioned in the discussion since they are clearly latitudinal dependent and can play a notable role in the differences among the five sites.

Ref. Castanheira, J.M., Peevey, T.R., Marques, C.A.F., Olsen, M.A. (2012), Relationships between Brewer–Dobson circulation, double tropopauses, ozone and strato-

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Randel. W.J., Seidel, D.J., Pan, L.L. (2007), Observational characteristics of double tropopauses, J. Geophys. Res., 112, D07309, doi:10.1029/2006JD007904

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Minor comments:

- Abstract. "from the five US sites...". I understand that no more sites have ozone records since 1960 in the US. Is this true?

- Figure 1. Although the coordinates of each site are indicated in the figure, I'd appreciate if the map is geo-localized.

- Figure 2. Please, add some discussion about this figure. For instance, the authors can discuss the latitudinal or longitudinal dependence of the threshold values among the five sites, and others.

- Tables 1 and 2. More statistical information should be given in these Tables. Although the standard error is given for each trend, I'd appreciate the knowledge of, e.g., the p value. Maybe it is possible to reduce these two tables to only one. With one table is easier to compare the two periods analyzed.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 21065, 2014.