

## **Review of “Anthropogenic Reversal of the Natural Ozone Gradient between Northern and Southern Mid-latitudes” (ACPD-2020-1198, Parrish et al)**

### **General comment**

In my view, this is an excellent paper that combines observations and model outputs in a manner that illustrates the complex phenomena driving ozone changes since pre-industrial times, and highlights what should become a standard test for current Earth System Models aimed at estimating anthropogenic climate forcing. After minor revisions, I warmly recommend publication in ACP.

### **Specific comments**

- In the text, there are several comparisons among trends derived from different observational and model output sets. Please specify the approach for calculating these trends and their corresponding error.
- Develop further the properties of the model STOCHEM-CRI that make it particularly useful for analyzing low NO<sub>x</sub> chemistry.
- Based on available long-term records in the Southern Hemisphere, you argue that the zonal variability of annual ozone means in the marine boundary layer is relatively small. However, Cape Grim, Ushuaia and Cape Point are subject to substantially different weather and (natural and anthropogenic) chemical regimes. Is this homogeneity also captured in models? What happens when you consider the seasonality of those data? Perhaps the similarity among ozone levels is just the result of compensating but quite different drivers.