

### **General comments:**

“The Antarctic stratospheric Nitrogen Hole: Southern Hemisphere and Antarctic springtime total nitrogen dioxide and total ozone variability in Sentinel-5p TROPOMI data” provides a scientifically useful analysis of a TROPOMI measurements of nitrogen dioxide during the Antarctic ozone hole. The study demonstrates that co-located TROPOMI NO<sub>2</sub> and O<sub>3</sub> observations can be used to clearly identify the evolution of chemical differences between inner and outer polar vortex air masses throughout the springtime. While demonstrating the viability of a new dataset for the analysis of the Antarctic ozone hole is scientifically important, improvements to the presentation of the data and details about the design of the analysis are needed.

### **Specific comments:**

1. The introduction could be improved by focusing on the advances offered by the TROPOMI dataset and the authors’ analysis, specifically:
  - a. What improvements or unique capabilities does this satellite dataset offer?
  - b. What problem or scientific question does the dataset answer?
  - c. The background on prior satellite studies could be condensed.
2. Additional details in the methods describing the range of latitudes used in each analysis are needed.
3. In the analysis of NO<sub>2</sub>/O<sub>3</sub> correlations, how are the mask boundaries determined? What effects are there, if any, on the conclusions of the analysis if the boundaries are varied?
4. Can the “mixing lines” be geographically and temporally isolated into discrete eddies/filaments?
  - a. Can the simple phase analysis of “mixing lines” recreate a similar structure on a 2-d plot? Figure 9 is not convincing on its own. Consider including actual seasonal trends.

### **Technical comments:**

1. Subscripts for the common notation of SNO<sub>2</sub> and TCO<sub>3</sub>
2. Improve the figure labels, especially dates
3. Figure 4 is redundant