

## **Northern Hemisphere Stratospheric Ozone Depletion Caused by Solar Proton Events: The Role of the Polar Vortex**

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## Introduction

The Supporting Information consists of two figures pertinent to the analysis described in this paper.

Figure S1 is the mean ozone partial pressure for the southern hemisphere site of Syowa. This is included for comparison with ozone partial pressure at the northern hemisphere sites plotted in Figure 2 in the paper. The mean ozone is calculated using ECC ozonesonde data from Syowa between 2009 and 2016. There is a very clear drop in ozone levels in spring months of September and October.

Figure S2 is the superposed temperature at the Ny-Ålesund site for the months January, February, March, and April - computed in exactly the same manner as the superposed ozone partial pressure at the four sites shown in Figure 4 of the paper. There is little change in the temperature around zero epoch, and no obvious trend.

### Text S1.

Figure S1 shows the mean ozone partial pressure for the southern hemisphere site of Syowa (2009-2016). Comparison with the northern hemisphere sites in Figure 2 indicates differences in stratospheric ozone between the two hemispheres, particularly during the spring.

### Text S2.

Figure S2 shows the superposed temperature at the Ny-Ålesund site (1991-2016) during 191 SPEs, calculated in the same manner as used for the ozone partial pressures shown in Figure 4. This plot shows the temperature for JFMA. There is no clear increase or decrease in the temperature at zero epoch, in contrast to the observed decrease in ozone partial pressure shown in Figure 4.

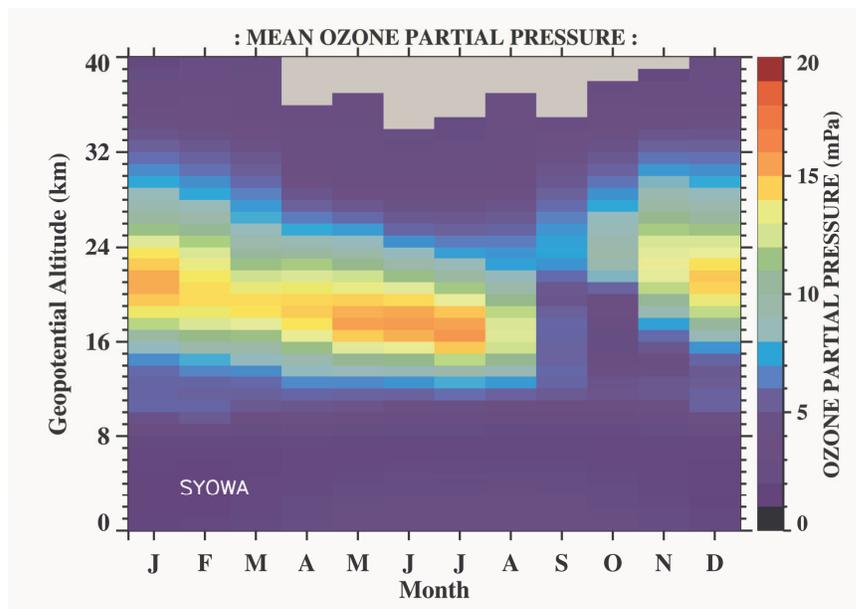


FIGURE S1

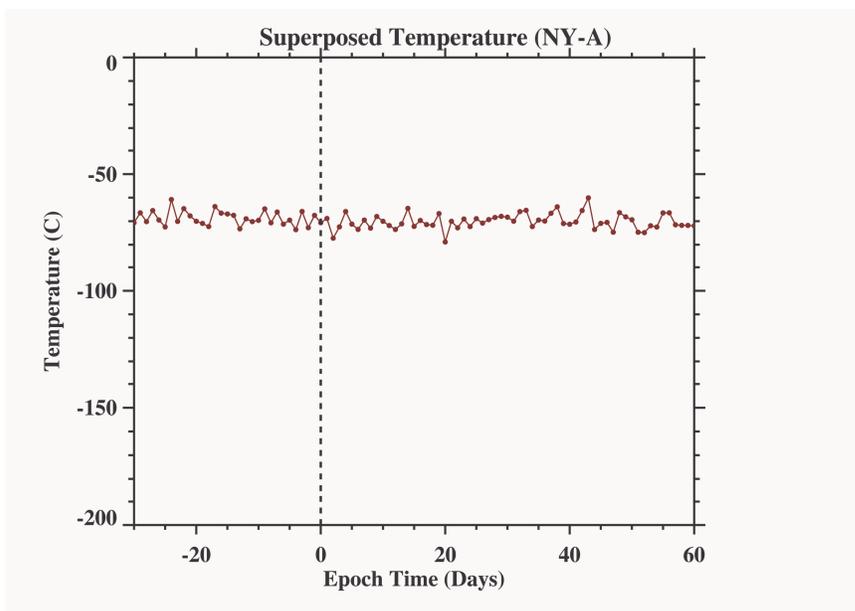


FIGURE S2

**Figure S1.** *The mean ozone partial pressure as a function of geopotential altitude for the Syowa site.*

**Figure S2.** *Showing the superposed temperature during SPEs at the Ny-Ålesund site (JFMA).*