



## Supplement of

## An Arctic ozone hole in 2020 if not for the Montreal Protocol

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**Figure S1.** Evolution of stratospheric Total Equivalent Effective Chlorine in ppbv, globally averaged, in the Real World run and the World Avoided, calculated as a linear combination of  $Cl_y$  and  $Br_y$ , with  $Br_y$  given weighting factors of 60 in the midlatitudes and 65 in the polar regions. The two diverge beginning in 1985 as described in the main text.



Figure S2. As for Figure 1, but for March 26, 2011.



Figure S3. As for the left panel of Figure 2, but in log-scale.





Figure S4. Comparison of ozone profiles for four different SD-WACCM simulations at SD-WACCM gridpoints nearest (top) Alert, (middle) Eureka, and (bottom) Resolute Stations for days in Spring 2020 where ozonesondings exist and reach at least to the middle stratosphere for a station. Note that the middle panel of the middle row is the same as Figure 4a in the main text.



Figure S5. As for Figure 5, but for the Antarctic from 70°S to 90°S.



**Figure S6.** Minimum ozone mixing ratios across the polar cap (70° N-90° N, all longitudes) for each day in 2020 for Real World (teal) and World Avoided (orange) runs in SD-WACCM at 73 mb.



45 Figure S7. (a) Comparison between the Real World and World Avoided profiles in SD-WACCM at the model gridpoint nearest to Eureka station for August 1<sup>st</sup>, 2019. Note the y-axis goes to lower pressures than the profiles in Figures 2 and 5. (b) Comparison between the total column ozone depletion and the partial column ozone depletion at altitudes above 20 mb in the Real World vs World Avoided runs.