Free tropospheric ozone reductions due to reduced emissions in the COVID-19 pandemic.

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Ozone soundings and NDACC Fourier Transform Infrared Spectrometers show a reduction of free tropospheric ozone in late spring and summer 2020 by about 7% at nearly all stations in the Northern Hemisphere. The observed ozone decrease is not reproduced by operational chemical weather analyses from the Copernicus Atmosphere Monitoring Service, which do not account for reduced emissions during the COVID-19 pandemic. Dedicated model simulations by the CAM-Chem model account for reduced emissions during the COVID-19 pandemic, and for 2020 meteorological conditions (including the Arctic ozone hole of 2020). They reproduce the observed northern hemispheric ozone decrease, and attribute about one third of the ozone decrease to reduced surface emissions, one third to reduced aircraft emissions, and one third to 2020 meteorological conditions (including the 2020 Arctic ozone hole). In the Southern Hemisphere, simulated emission related ozone reductions appear to have been masked by 2020 meteorological conditions (including the large wild-fires in Australia) - consistent with observed "normal" free tropospheric ozone at the few stations in the Southern Hemisphere.