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Air Quality Impacts of COVID-19 Lockdown Measures using high-resolution observations of multiple trace gases from S5P/TROPOMI

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The lockdown measures taken to combat the COVID-19 virus implemented in a majority of countries worldwide have had a dramatic impact on the anthropogenic pollutant emissions, related to a drastic reduction of road and air traffic, as well as part of the industrial activities. In our contribution we investigate the presence of COVID-19-related imprints in air quality as observed from space, focussing on worldwide industrial/highly populated regions where strong lockdown measures have been taken (e.g., China, Europe, US). This is done by exploiting the observations of the TROPOMI instrument onboard the Copernicus Sentinel-5P platform, for a number of trace gases which are indicators of anthropogenic activity. We make use of the TROPOMI operational product portfolio, which includes tropospheric NO2, CO, SO2, and HCHO. These operational data products are complemented by other scientific products such as the BIRA-IASB glyoxal (CHOCHO) retrievals and a new SO2 retrieval algorithm called COBRA. The reductions in NO2 observed by TROPOMI have been documented already in the recent literature for several regions and countries worldwide. In our contribution we focus on the combined observations of multiple trace gases, which provides not only information about how much primary (NOx) emissions decreased, but also gives region-to-region insights and constraints on the overall changes in atmospheric composition as a result of these lockdowns.