



EMS Annual Meeting Abstracts

Vol. 18, EMS2021-427, 2021

<https://doi.org/10.5194/ems2021-427>

EMS Annual Meeting 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Quantification of the Emission Changes in Europe During 2020 Due to the COVID-19 Mobility Restrictions

Marc Guevara<sup>1</sup>, Oriol Jorba<sup>1</sup>, Hervé Petetin<sup>1</sup>, Hugo Denier Van Der Gon<sup>2</sup>, Jeroen Kuenen<sup>2</sup>, Ingrid Super<sup>2</sup>, Vincent-Henri Peuch<sup>3</sup>, and Carlos Pérez García-Pando<sup>1,4</sup>

<sup>1</sup>BARCELONA SUPERCOMPUTING CENTER, Earth Sciences, Barcelona, Spain (marc.guevara@bsc.es)

<sup>2</sup>Netherlands Organization for Applied Scientific Research (TNO), Utrecht, Netherlands

<sup>3</sup>European Centre for Medium-Range Weather Forecasts, Reading, UK

<sup>4</sup>Catalan Institution for Research and Advanced Studies (ICREA), Barcelona, Spain

To hinder the circulation of the COVID-19 virus, European governments implemented emergency measures going from light social distancing to strict lockdowns, depending on the country. As a consequence, many industries, businesses and transport networks were forced to either close down or drastically reduce their activity, which resulted in an unprecedented drop of anthropogenic emissions. This work presents the Copernicus Atmosphere Monitoring Service (CAMS) European regional emission adjustment factors associated to the COVID-19 mobility restrictions, an open source dataset of daily-, sector-, pollutant- and country-dependent emission adjustment factors for Europe linked to the COVID-19 pandemic. The resulting dataset covers a total of six emission sectors, including: road transport, energy industry, manufacturing industry, residential and commercial combustion, aviation and shipping. The time period covered by the dataset includes the first and second waves of the disease occurred during 2020, starting from 21 February, when the first European localised lockdown was implemented in the region of Lombardy (Italy), until 31 December, when COVID-19 transmission remained widespread and several countries had nationwide restrictions still in place. The adjustment factor dataset is based on a wide range of information sources and approaches, including open access and measured activity data and meteorological data, as well as the use of machine learning techniques. We combined the computed emission adjustment factors with the CAMS European gridded emission inventory to spatially (0.1x0.05 degrees) and temporally (daily) quantify reductions in 2020 emissions from both criteria pollutants (NO<sub>x</sub>, SO<sub>2</sub>, NMVOC, NH<sub>3</sub>, CO, PM10 and PM2.5) and greenhouse gases (CO<sub>2</sub> fossil fuel, CO<sub>2</sub> biofuel and CH<sub>4</sub>) as compared to a business-as-usual scenario, as well as to assess the contribution of each sector and country to the overall reductions. The resulting gridded and time-resolved emission reductions suggest an heterogeneous impact of the COVID-19 restrictions across pollutants, sectors and countries.