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## The Climate Response to Emissions Reductions due to COVID-19

**Chris Jones**<sup>1</sup> and the Covid-MIP analysis\*

<sup>1</sup>Met Office Hadley Centre, Climate Science, Exeter, United Kingdom of Great Britain – England, Scotland, Wales  
([chris.d.jones@metoffice.gov.uk](mailto:chris.d.jones@metoffice.gov.uk))

\*A full list of authors appears at the end of the abstract

Many nations responded to the COVID-19 pandemic by restricting travel and other activities during 2020, resulting in temporarily reduced emissions of CO<sub>2</sub>, other greenhouse gases and ozone and aerosol precursors. We perform a coordinated Intercomparison, CovidMIP, of Earth System model simulations to assess the impact on climate of these emissions reductions. Eleven models performed multiple initial-condition ensembles to produce over 280 simulations spanning both initial condition and model structural uncertainty. We find model consensus on reduced aerosol amounts (particularly over East Asia) and associated increases in surface shortwave radiation levels. However, any impact on near-surface temperature or rainfall during 2020-2024 is extremely small and is not detectable in this initial analysis. Regional analyses on a finer scale, and closer attention to extremes (especially linked to changes in atmospheric composition and air quality) are required to test the impact of COVID-19-related emission reductions on near-term climate.

This first-look at results has focussed on surface climate, but future analysis will include attribution of drivers of climate signals; longer term implications of emissions reductions and options for economic recovery; quantifying changes in extremes; influence on atmospheric circulation and the carbon cycle.

**Covid-MIP analysis:** Chris D. Jones, Jonathan E. Hickman, Steven T. Rumbold, Jeremy Walton, Robin D. Lamboll, Ragnhild B. Skeie, Stephanie Fiedler, Piers M. Forster, Joeri Rogelj, Manabu Abe, Katherine Calvin, Christophe Cassou, Jason Cole, Paolo Davini, Makoto Deushi, Martin Dix, John Fyfe, Nathan Gillett, Michio Kawamiya, Maxwell Kelley, Slava Kharin, Tsuyoshi Koshiro, Chloe Mackallah, Pierre Nabat, Twan van Noije, Paul Nolan, Rumi Ohgaito, Dirk Olivié, Naga Oshima, Jose Parodi, Thomas Reerink, Lili Ren, Anastasia Romanou, Roland Seferian, Yongming Tang, Jerry Tjiputra, Etienne Tourigny, Kostas Tsigaridis, Hailong Wang, Mingxuan Wu, Klaus Wyser, Shuting Yang, Yang Yang, Tilo Ziehn