

Climate responses to emissions reductions caused by COVID-19 lockdown and restrictions

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The worldwide dramatic responses to the COVID-19 pandemic, following China's nationwide lockdown in late January 2020, have led to a large reduction in human activities and thus emissions of greenhouse gases and air pollutants. This has also triggered research interest in the environmental and climate sciences community in understanding the impacts of these reductions. Some early observation-based and modeling studies have shown discernible impacts of COVID-19 lockdowns and restrictions on regional air quality and climate. By prescribing aerosol emission changes during the lockdown, back-to-work and post-lockdown stages of COVID-19 in a global climate model, Yang et al. (2020) show a surface warming effect over several continental regions of the Northern Hemisphere via aerosol-radiation and aerosol-cloud interactions. The IPCC has a desire to include an assessment of such climate impacts associated with the COVID-19 lockdown, restrictions, and recovery scenarios in the forthcoming Sixth Assessment Report (AR6). Dozens of international modeling groups started coordinating model intercomparison experiments (COVID-MIP) to examine near-term and long-term climate impacts of COVID-19. E3SM is one of the participating models. Using E3SMv1, we have started a small ensemble of simulations that impose a "2-year blip" forcing (i.e., two-year COVID-lockdown emissions reductions) based on the SSP2-45 scenario. These simulations are currently in progress and expected to be completed by mid-October. We will discuss the initial analysis and results in this presentation.

Reference:

Yang, Y., Ren, L., Li, H., Wang, H., Wang, P., Chen, L., et al. (2020). Fast climate responses to aerosol emission reductions during the COVID-19 pandemic. *Geophysical Research Letters*, 47, e2020GL089788. <https://doi.org/10.1029/2020GL089788>