Assessing the Meteorological Impact on Methane (CH$_4$) Emission Changes in New York City During the COVID-19 Shutdown

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In mid-March, New York City enforced stay-at-home orders in hopes to curb the spread of the COVID-19 virus. As a result, workplaces, restaurants, and schools gradually closed, and transportation decreased. By using this citywide shutdown as a natural experiment, we were able to quantify methane reductions and identify new emission sources across the city. We used the atmospheric transport model HRRR-STILT to identify locations and timing of methane reductions and compared them to direct observations taken from January through summer of 2020. Since the lockdown began, we have observed a 5% reduction in concentration, with the largest influence driven by southerly winds. Current inventories underestimate emissions by at least a factor of three, and thus lack sources that could explain the observed reduction. These findings highlight the need to improve the accuracy of methane inventories if we are to make strides in reducing urban methane emissions.