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Space-based detection of CO_2 emission reductions due to COVID-19 at Europe's largest fossil fuel power plant and implications for CO_2 emission monitoring

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In 2020, many countries implemented lockdowns to control the spread of the novel coronavirus disease (COVID-19), leading to reported decreases in anthropogenic CO_2 emissions based on bottom-up estimates. Some studies reported that the resulting atmospheric CO_2 changes were below the detection limit of current observing systems on the ground or in space. We quantify CO_2 emissions from Europe's largest fossil fuel burning power plant before and during lockdown using space-based CO_2 observations from NASA's Orbiting Carbon Observatory (OCO) 2 and 3 missions. The results show clear emission reductions of >20% in April 2020, demonstrating the ability of space-based CO_2 observations to quantify emission reductions at the facility level. This research reinforces the value of space-based CO_2 data for verifying future CO_2 emission reductions expected from climate change mitigation policies and the importance of monitoring emissions at sub-national scales.