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## Chinese emissions reductions deliver reduced PM<sub>2.5</sub>-caused mortality across China during 2015-2017

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Air pollution is a serious environmental issue and leading contributor to the disease burden in China. Following severe air pollution episodes during the 2012-2013 winter, the Chinese government has prioritised efforts to reduce PM<sub>2.5</sub> emissions, and established a national monitoring network to record air quality trends. Rapid reductions in fine particulate matter (PM<sub>2.5</sub>) concentrations and increased ozone concentrations have occurred across China, during 2015 to 2017. We used measurements of particulate matter with a diameter < 2.5 µm (PM<sub>2.5</sub>) and Ozone (O<sub>3</sub>) from >1000 stations across China combined with similar datasets from Hong Kong and Taiwan to calculate trends in PM<sub>2.5</sub>, Nitrogen Dioxide, Sulphur Dioxide and O<sub>3</sub> across the greater China region during 2015-2019. We then use the Weather Research and Forecasting model coupled with Chemistry (WRF-Chem) regional air quality simulations, to explore the drivers and impacts of observed trends. Using annually varying emissions from the Multi-resolution Emission Inventory for China, we simulate air quality across China during 2015-2017, and calculate a median PM<sub>2.5</sub> trends of -3.9 µg m<sup>-3</sup> year<sup>-1</sup>. The measured nationwide median PM<sub>2.5</sub> trend of -3.4 µg m<sup>-3</sup> year<sup>-1</sup>. With anthropogenic emissions fixed at 2015-levels, the simulated trend was much weaker (-0.6 µg m<sup>-3</sup> year<sup>-1</sup>), demonstrating interannual variability in meteorology played a minor role in the observed PM<sub>2.5</sub> trend. The model simulated increased ozone concentrations in line with the measurements, but underestimated the magnitude of the observed absolute trend by a factor of 2. We combined simulated trends in PM<sub>2.5</sub> concentrations with an exposure-response function to estimate that reductions in PM<sub>2.5</sub> concentrations over this period have reduced PM<sub>2.5</sub>-attributable premature mortality across China by 150 000 deaths year<sup>-1</sup>.