1.158 Analysis of trends in Chinese Air Quality: results from a new monitoring network..

Early Career Scientist

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Abstract:

China’s rapid industrialisation and urbanisation has led to poor air quality, which studies estimate causes over one million premature deaths per year. The Chinese government have responded by introducing regulations to attempt to reduce industrial emissions and setting ambitious targets for ambient NO_2, $PM_{2.5}$ and SO_2 concentrations. Previous satellite and modelling studies indicate that concentrations of these pollutants have begun to decline within the last decade. However, many studies suffer from a lack of measurements to verify their estimates.

Prior to 2013, air quality measurement data from ground-based monitoring stations were difficult to obtain, limited to a few locations in major cities, and often unreliable. Since then, there has been a drive to establish a more comprehensive and reliable monitoring network, with over 1000 stations being established by the Ministry of Environmental Protection (MEP) across China.

We use a three-year (2015-2017) dataset consisting of hourly $PM_{2.5}$, O_3, NO_2 and SO_2 concentrations that has been scraped from the MEP website, combined with similar data from Taiwan and Hong Kong. We have rigorously cleaned the data, detecting several anomalies, some of which have not been discussed in previous literature. Statistical techniques are used to derive estimates of trends across China, revealing that for the majority of stations, SO_2 and $PM_{2.5}$ have decreased significantly, while NO_2 is more mixed, and O_3 concentrations have increased significantly. O_3 has been identified as one of the atmospheric pollutants that is most harmful to human health, which is concerning as O_3 is not currently subject to government targets and control measures in China. We use the WRF-Chem model to explore potential drivers of these observed trends.