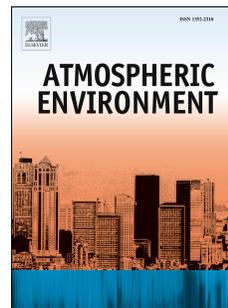


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PM_{2.5} and gaseous pollutants in New York State during 2005–2016: Spatial variability, temporal trends, and economic influences

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1 **PM_{2.5} and gaseous pollutants in New York State during 2005-2016: spatial** 2 **variability, temporal trends, and economic influences**

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9 **Abstract**

10 Over the past decades, mitigation strategies have been adopted both by federal and state agencies
11 in the United States (US) to improve air quality. Between 2007 and 2009, the US faced a
12 financial/economic crisis that lowered activity and reduced emissions. At the same time,
13 changes in the prices of coal and natural gas drove a shift in fuels used for electricity generation.
14 Seasonal patterns, diel cycles, spatial gradients, and trends in PM_{2.5} and gaseous pollutants
15 concentrations (NO_x, SO₂, CO and O₃) monitored in New York State (NYS) from 2005 to 2016
16 were examined. Relationships between ambient concentrations, changes in NYS emissions
17 retrieved from the US EPA trends inventory, and economic indicators were studied. PM_{2.5} and
18 primary gaseous pollutants concentrations decreased across NYS. By 2016, PM_{2.5} and SO₂
19 attained relatively homogeneous concentrations across the state. PM_{2.5} concentrations decreased
20 significantly at all sites. Similarly, SO₂ concentrations declined at all sites within this period,
21 with the highest slopes observed at the urban sites. Reductions in NO_x emissions likely
22 contributed to summertime average ozone reductions. NO_x and VOCs controls reduced O₃ peak
23 concentrations at rural and suburban sites as seen in significant relationships between the annual
24 O₃ 4th-highest daily maximum 8-hour concentrations and estimated NO_x emissions at rural and
25 suburban sites ($r^2 \sim 0.7$). Spring maxima were not reduced with most sites showing insignificant
26 slopes or significant positive slopes (e.g., +2.6 % y⁻¹ and +2% y⁻¹, at CCNY and PFI,
27 respectively). Increases in autumn and winter ozone concentrations were found (e.g., $6.6 \pm 0.4\%$
28 y⁻¹ on average in New York City). Significant relationships were observed between PM_{2.5},
29 primary pollutants, and economic indicators. Overall, a decrease in electricity generation with
30 coal, and the simultaneous increase in natural gas consumption for power generation, led to a
31 decrease in PM_{2.5} and gaseous pollutants concentrations.

32
33 **Keywords:** Trends, air pollution, spatial variability, policy, economics

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