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Climatological influences on the interannual and seasonal variations of fine particulate matter (PM2.5) cross Southern Ontario, Canada

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Abstract

Fine particulate matter (PM2.5) is a major pollutant that has adverse health effects. This study is to assess how climate impacts seasonal and interannual variations of PM2.5 in southern Ontario, Canada. PM2.5 concentration varies considerably from season to season in Ontario. In the summer, mean PM2.5 value is high and high PM2.5 episode occurs more frequently. PM2.5 concentration is greatly dependent on the weather. There is no single dominant meteorological condition that can fully explain the variation of PM2.5. High PM values are often associated with days when it is stagnant with hot, humid, and slow wind, while low PM values often occur if it is cool, dry, and windy. Trajectory and weather pattern analyses suggest that synoptic transport of pollutants from highly polluted area in the United States is a major factor responsible for high PM2.5 episode events. The ventilation by cold fronts appears to be the main mechanism for clean air with low PM2.5 concentrations in Ontario. From 2004 to 2011, PM2.5 in Ontario shows a decreasing trend, mostly due to reduction in emission. With this background, PM2.5 varies inter annually with variability in weather, especially with change in temperature.

Biography

Jane Liu received her Ph.D. in Atmospheric Science from University of Toronto. She is an Assistant Professor in the Department of Geography and Program in Planning, University of Toronto. She has authored and co-authored about 40 referred journal papers and book chapters. She has been serving as an editorial board member of The Scientific World Journal and Dataset Papers in Geosciences. Her research focuses on understanding underlying mechanisms controlling processes related to environmental issues. She uses advanced atmospheric and ecological models to mimic these processes and to diagnose their interactions.