Despite significant reduction in smog-producing toxins, the Greater Toronto Area still violates ozone standards

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Despite a significant reduction in smog-producing toxins in past decade, GTA still violates Canada's ozone standards

A new study shows that while the Greater Toronto Area (GTA) has significantly reduced some of the toxins that contribute to smog, the city continues to violate the Canada-wide standards for ozone air pollution.

Smog, which can cause or aggravate health problems such as asthma, emphysema and chronic bronchitis, is produced by a set of complex photochemical reactions involving volatile organic compounds (VOCs), nitrogen oxides and sunlight, which form ground-level ozone. Smog-forming pollutants come from many sources including automobile exhaust, power plants, factories and many consumer products, such as paint, hairspray, charcoal starter fluid and chemical solvents. In a typical urban area, at least half of the smog precursors come from cars, buses, trucks and boats. Research led by Jennifer Murphy of the Department of Chemistry at the University of Toronto has found that in the GTA between 2004 and 2012, nitrogen oxides and VOCs were reduced by at least 20 per cent between 2004 and 2012.

"These reductions are in line with the city's 2007 commitment to reducing smog precursors, and can be attributed to the implementation of pollution control measures like the Drive Clean program, and the closure of coal-fired power plants in the region," said Murphy.

Despite this good news, ozone concentrations are not following the same encouraging patterns. Canada-wide standards for ozone continued to be exceeded at all monitoring stations in the GTA. While the team noted lower ozone levels between 2008 and 2011 than in previous years, 2012 marked one of the highest recorded summer ozone concentrations as well as a large number of smog episodes.

Major smog occurrences often are linked to heavy motor vehicle traffic, high temperatures, sunshine and calm winds. Weather and geography affect the location and severity of smog. Because temperature and sunlight regulates the length of time it takes for smog to form, smog can occur more quickly and be more severe on a hot, sunny day.

"We are able to show that high ozone in 2012 was due to the relatively high number of sunny days that allowed ozone to be produced quickly, and low winds, that allowed the pollution to accumulate locally," said Murphy.

The team obtained the data from federal and provincial government monitoring sites throughout the GTA between 2000 and 2012. Their study, entitled "The impacts of precursor reduction and meteorology on ground-level ozone in the Greater Toronto Area," was published in *Atmospheric Chemistry and Physics* on August 15, 2014. Other members of the U of T research team are Stephanie C. Pugliese, Jeffrey A. Geddes and Jonathan M. Wang.

More information: *Atmospheric Chemistry and Physics* , www.atmos-chem-phys.net/14/819 … acp-14-8197-2014.pdf

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