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Alert

Alert is a monthly update on transportation and air quality planning activities in the Delaware Valley.

Air Quality News

Asian Pollution and Heat Waves Exacerbate Ozone Pollution in the U.S.

New research published in the Journal *Atmospheric Chemistry and Physics* claims that despite a 50 percent cut in ozone-forming chemicals such as nitrogen oxides (NO_x), over the past 25 years, ozone levels measured in rural areas of the western U.S. have actually climbed. And while ozone in the eastern U.S. has decreased overall, the levels can spike during heat waves.

The study, conducted by scientists at Princeton University and the National Oceanic and Atmospheric Administration (NOAA), traced the increase of ozone in the west to the influx of pollution from Asian countries, including China, North and South Korea, Japan, and India, among others. Collectively, the region has tripled its emissions of NO_x since 1990. In the eastern U.S., meanwhile, heat waves, which have become more frequent in the past few decades, trap polluted air in place, leading to temporary escalations in locally produced ozone.

The study explains why springtime ozone levels measured in Yellowstone National Park and other western parks, far from urban areas, have climbed over the past quarter century. According to the study, springtime ozone levels in the national parks rose during that period by 5 to 10 parts per billion (ppb), which is significant given that the federal ozone standard is 70 ppb.

According to the study's authors, the influx of pollution from Asia could make it difficult for these areas to comply with the federal ozone standards. "Increasing background ozone from rising Asian emissions leaves less room for local production of ozone before the federal standard is violated," said lead author Meiyun Lin, a researcher at Princeton University.

In the eastern U.S., where Asian pollution is a minor contributor to ozone levels, NO_x emission controls have been successful at reducing ozone pollution. However, periods of extreme heat and drought can trap pollution in the region, making bad ozone days worse. According to the researchers, regional NO_x emission reductions alleviated the ozone buildup during the recent heat waves of 2011 and 2012, compared to earlier heat waves such as in 1988 and 1999. As heat waves appear to be on the rise due to global climate change, ozone pollution in the eastern U.S. is likely to worsen.

Save the Date

Sunday,
April 9, 2017

Clean Air Council 5K for Clean Air

Location of Event:
Eakins Oval
Philadelphia Museum of Art

Register at:
http://runforcleanair.org

Friday,
April 28, 2017

Temple University Earthfest

Location of Event:
Temple University
Ambler Campus

Event Information at:
http://ambler.temple.edu/about/earthfest

The negative effect of imported pollution on the U.S.'s ability to achieve its air quality goals is not wholly unexpected, according to Owen Cooper, a senior research scientist at the University of Colorado and the NOAA Earth System Research Laboratory. "Twenty years ago, scientists first speculated that rising Asian emissions would one day offset some of the United States' domestic ozone reductions," Cooper said. "This study takes advantage of more than 25 years of observations and detailed model hind casts to comprehensively demonstrate that these early predictions were right."

For more information on ozone trends in the U.S., please visit: www.atmos-chem-phys.net/17/2943/2017/

Air Quality and Health

Research Shows that Heat Waves and Poor Air Quality Exacerbate the Health Impacts of Each Condition

According to new research, published in the *Proceedings of the National Academy of Sciences*, researchers from the University of California, Irvine (UCI) claim that the combination of prolonged hot spells with poor air quality greatly compounds the negative effects of each and can pose a major risk to human health.

"The weather factors that drive heat waves also contribute to intensified surface ozone and air pollution episodes," said UCI professor of Earth System Science and co-author of the study, Michael J. Prather,. "These extreme, multiday events tend to cluster and overlap, worsening the health impacts beyond the sum of their individual effects."

Heat waves cause widespread discomfort and can be deadly for vulnerable individuals, while surface ozone and air pollution are linked to premature death from heart disease, stroke, and lung ailments.

Prather's group made the findings after examining 15 years of surface observations (1999-2013) for the eastern United States and Canada. The researchers overlaid a grid of one-degree-square segments onto a map of the region and analyzed the recorded levels of surface ozone, amounts of fine particulate matter ($PM_{2.5}$), and maximum temperatures between April and September for each roughly 69-by-69-mile section of the map. This process allowed them to construct a climatological picture of the duration, coincidence, and overlap of each of these factors.

Meteorologically, slow-moving high-pressure systems accumulate pollutants and heat during the summer months. Scorching temperatures, low precipitation, strong sunlight, and low wind speeds, associated with high pressure systems, allow heat and poor-quality air to stagnate in a given location for an extended period of time.

"These conditions increase the emission of biogenic volatile organic compounds, which boost the production of surface ozone and other aerosols," said lead author Jordan Schnell, a postdoctoral researcher at UCI. "The drought-like conditions that exist in heat waves reduce soil moisture, making near-surface temperatures hotter and inhibiting the role played by vegetation in absorbing ozone, resulting in lower air quality."

Humans only make the problem worse by consuming more fossil fuel-generated energy to run air conditioners, the researchers noted.

"It's important to study the combined effects of pollution and prolonged heat events because we expect these conditions to become more prevalent in a warming climate," Prather said. "Our evidence suggests that pollution and heat waves are synergistic stressors that produce disproportionately greater adverse health impacts. Policymakers should be taking these issues into consideration going forward."

For more information on the article "*Co-Occurrence of Extremes in Surface Ozone, Particulate Matter, and Temperature Over Eastern North America* " please visit: https://news.uci.edu/research

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