

Foreign ozone emissions lower U.S. air quality

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When it comes to environmental impacts, no nation is an island. A recent study from the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison finds that up to 15 percent of U.S. air pollution comes from Asian and European sources.

"It is useful to understand how much air pollution is coming from areas outside our own region, so that when we're thinking about how to cut down ozone concentrations, we can take into account what factors we have control over and what factors we don't have control over," says Tracey Holloway, a professor of environmental studies in the Center for Sustainability and the Global Environment (SAGE), who led the new study.

Unlike the protective stratospheric ozone layer, surface ozone is a pollutant and has been implicated in increased mortality rates, respiratory and cardiovascular disease, and vegetative and crop damage.

Using a computer model that analyzed global wind data and chemical emissions from various countries, the research group found that the impact of Asian and European ozone contributions varies across the country.

While previous computer modeling studies have examined ozone transportation between entire continents, often focusing on spring and summer, Holloway explains, "[Our study] is the first that has laid out the seasonality of ozone import to specific regions of the United States."

Holloway will present the group's findings today (Dec. 13) at the American Geophysical Union meeting in San Francisco.

Overall, the models showed Asian and European emissions contributed three to 18 percent of total surface ozone on a monthly average basis across the U.S.

"These air pollutants don't come with an import/export label, so it's useful to be using these models to identify what fraction is coming from individual sources," says Holloway.

The western states endured the heaviest impact, due to their proximity to Asia and the predominance of west-to-east wind currents, Holloway says. Foreign emissions contributed an annual average of 12 percent of the total surface ozone along the West Coast, but only six to ten percent along the East Coast.

Spring and fall peaks of imported ozone were evident in all regions as a result of the optimal combination of a strong jet stream across the Pacific Ocean and stability of ozone during these seasons.

Next, the group will work with high-resolution models to study how the imported pollution interacts with local and regional weather patterns and emissions.

Knowing the extent of foreign contributions can help local and federal governments develop plausible pollution and environmental policies, Holloway says. "To design effective regulations for ozone, one of the questions you want to know is how much is coming in from outside our borders that we can't control domestically," she explains.

The study's findings also suggest that reducing foreign emissions may improve U.S. air quality, a potential incentive for the federal government

to promote global clean air standards, Holloway says.

Source: University of Wisconsin-Madison

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