US fires release large amounts of carbon dioxide

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Large-scale fires in a western or southeastern state can pump as much carbon dioxide into the atmosphere in a few weeks as the state's entire motor vehicle traffic does in a year, according to newly published research by scientists at the National Center for Atmospheric Research (NCAR) and the University of Colorado at Boulder.

The paper, "Estimates of CO2 from fires in the United States: implications for carbon management," is being published online today in the journal "Carbon Balance and Management." NCAR's portion of the research was supported by the National Science Foundation, NCAR's principal sponsor.

The authors, Christine Wiedinmyer of NCAR and Jason Neff of the University of Colorado, used satellite observations of fires and a new computer model, developed by Wiedinmyer, that estimates carbon dioxide emissions based on the mass of vegetation burned. They caution that their estimates have a margin of error of about 50 percent, both because of inexact data about the extent of fires and varying estimates of the amount of carbon dioxide emitted by different types of blazes.

Overall, the study estimates that fires in the contiguous United States and Alaska release about 290 million metric tons of carbon dioxide a year, which is the equivalent of 4 to 6 percent of the nation's carbon dioxide emissions from fossil fuel burning. But fires contribute a higher proportion of the potent greenhouse gas in several western and southeastern states, especially Alaska, Idaho, Oregon, Montana,

Washington, Arkansas, Mississippi, and Arizona. Particularly large fires can release enormous pulses of carbon dioxide rapidly into the atmosphere.

"A striking implication of very large wildfires is that a severe fire season lasting only one or two months can release as much carbon as the annual emissions from the entire transportation or energy sector of an individual state," the authors write.

California fires

Although last week's fires in southern California broke out after the paper was written, Wiedinmyer applied the new computer model to analyze their emissions. Her preliminary estimates indicate that the fires emitted 7.9 million metric tons of carbon dioxide in just the one-week period of October 19-26, the equivalent of about 25 percent of the average monthly emissions from all fossil fuel burning throughout California.

"Enormous fires like this pump a large amount of carbon dioxide quickly into the atmosphere," Wiedinmyer says. "This can complicate efforts to understand our carbon budget and ultimately fight global warming."

Challenge for policymakers

Carbon dioxide emissions from fires pose a significant challenge as policymakers focus on limiting greenhouse gases because of concerns over climate change. Some jurisdictions, such as California, have not yet decided whether to include wildfire emissions when setting targets to reduce greenhouse gases.

The impacts of fires on climate change are complex and difficult to predict. Long after a fire sweeps through an area, new vegetation over the course of several decades to a century may absorb as much carbon dioxide as was released during the blaze. But fires are likely to become more frequent and widespread as temperatures warm around much of the globe, which means that more carbon dioxide may be released into the atmosphere. The fires could complicate government efforts to rely on forests to help absorb carbon dioxide.

"The fires that are burning today in the United States are part of the legacy of the past century of fire suppression," says Neff, an assistant professor of environmental studies. "Our attempts to control fire have had the unintended benefit of sequestering more carbon in our forests and reducing the impact of human combustion of fossil fuels. But as these forests now begin to burn, that stored twentieth century carbon is moving back into the atmosphere, where it may compound our current problems with CO2."

The new study found that evergreen forests in the South and West are the dominant U.S. sources for carbon dioxide emissions from fires. Fires in grasslands and agricultural areas, where vegetation is less dense, emit far less carbon dioxide. The extent of U.S. fires varies widely from year to year, but typically the emissions have a small peak in the spring from fires in the southeastern and central United States, and a larger peak in the summer during the fire season in the West.

Source: National Center for Atmospheric Research