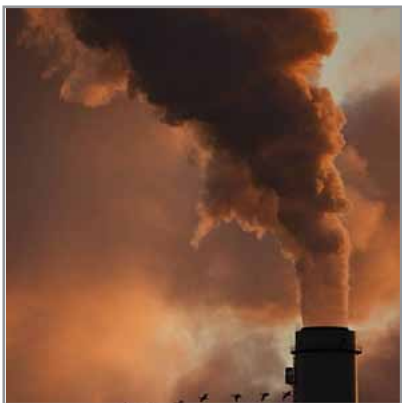


## Scientists Say Soot a Key Factor in Warming



Source: San Francisco Chronicle  
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Author: David Perlman

Soot from diesel engines, coal-fired power plants and burning wood is a bigger cause of global warming than previously thought, and is the major cause of the rapid melting of the Arctic's sea ice, Stanford climate experts say.

The evidence of mounting pollution by carbon particles in soot has been inadequately counted in international government debates over policies to cope with the warming problem, according to Stanford's Mark Z. Jacobson, leader of the university's Atmosphere and Energy program and a professor of civil and environmental engineering.

In a report to be published Thursday in the *Journal of Geophysical Research*, Jacobson noted that soot particles - both black and brown carbon - come not only from burning fossil fuels in industry and transportation, but also from the immense quantities of wood and dung that are burned for heating and cooking throughout the developing world.

Those factors combined make black and brown carbon in soot an even more powerful contributor to global warming than industrial emissions of methane, which until now have been considered the second most important cause of climate change, Jacobson said.

And because soot absorbs sunlight as it falls on ice and snow and radiates back to Earth from clouds and layers of the atmosphere, it is the major reason for rapidly melting sea ice in the Arctic region, he said.

Controlling soot may be the only way to significantly slow Arctic warming over the next two decades, Jacobson said.

"We have to start taking its effects into account in planning mitigation efforts, and the sooner we start making changes, the better," he said.

Using a sophisticated computer model he developed over 20 years, Jacobson also studied mortality figures from the World Health Organization and epidemiological reports from American health agencies. He said he found that soot emissions account for at least 1.5 million premature deaths each year around the world and lead to respiratory illness, heart disease and asthma - mostly in the developing world where wood and animal dung are used for heating and cooking.

James Hansen, a leading climate expert at NASA's Goddard Institute for Space Studies and an outspoken advocate of strong political action to combat global warming, agrees that soot is a major factor in the rapid melting of Arctic sea ice.

In an e-mail to *The Chronicle*, Hansen referred to soot particles as "dirty aerosols," saying that the melting of ice in the Arctic and worldwide is "usually attributed solely to global warming," and that the role of soot has not been adequately acknowledged.

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“Saving Arctic sea ice will require the combination of slowing carbon dioxide emissions and keeping the Arctic pristine via controls on dirty aerosol emissions,” Hansen said.

Controlling the soot created by burning fossil fuels, like oil and coal, and from burning wood and dung “may help to reduce Arctic ice loss and global warming faster than any other control option available,” Jacobson concluded.

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