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Soot eats clouds, turns up global thermostat

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By Environmental News Network staff

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Soot absorbs heat and warms the air, causing clouds to evaporate and the atmosphere to change color

Coal-burning power plants. Diesel-burning cars and buses. Dung burnt for heating and cooking. All are sources of soot, and all combine to create a hazy concoction that reduces cloud cover and enhances global warming, according to a report in today's issue of *Science*.

"There is one huge soup of pollution coming off the (Indian) subcontinent," said Andy Ackerman, a scientist at NASA's Ames Research Center in Moffett Field, California. "The sun comes up, black particles absorb sunlight, and when they heat up they warm the air and evaporate clouds."

With less cloud cover reflecting sunlight back to space, increased solar energy reaches Earth's surface and the lower atmosphere, causing a warming of the atmosphere and oceans.

In fact, this mechanism amounts to a warming that is three to five times greater than that of the greenhouse effect attributed to carbon dioxide emissions since the Industrial Revolution of the 1800s, said Ackerman, lead author of the study.

Ackerman and colleagues collected their data in the tropical Indian Ocean during the dry monsoon months of February and March in 1998 and 1999. The research is part of the Indian Ocean Experiment, an international project to quantify the indirect effect of aerosols on climate through their effects on clouds.

"This (soot) effect definitely kills clouds," said Ackerman, "but it is not the only effect."

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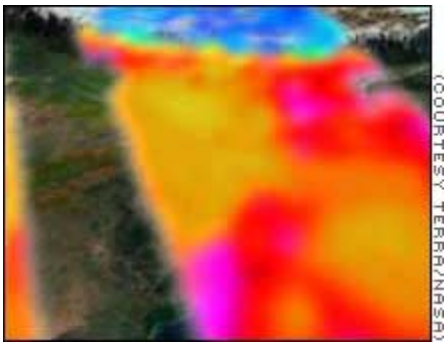

In this satellite image of the Indian subcontinent recorded in March 2000, high levels of carbon monoxide appear red and yellow, and the atmosphere over the Himalaya mountains at the top appear blue

Daniel Rosenfeld, a scientist at Hebrew University of Jerusalem in Israel, reported in the March 10 issue of *Science* that aerosols such as sulfates and sulfuric acid from lead smelters and oil refineries increase the number of tiny water droplets in clouds to the extent that the droplets can no longer coalesce to form rain.

Owen Toon, an atmospheric scientist at the University of Colorado at Boulder, points out that aerosol pollutants also reflect sunlight back to space, rendering a cooling effect on Earth that may cancel out the warming effect of greenhouse gases.

"These recent studies demonstrate both the importance of aerosol effects on climate and the complexity of aerosol-cloud interactions," write Stephen Schwartz of the Brookhaven National Laboratory in Upton, New York, and Peter Buseck of Arizona State University in Tempe, in an accompanying *Science* article.

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