

Organic vapors affect clouds leading to previously unidentified climate cooling

May 5 2013



Cloud in Nepali sky. Credit: Wikipedia

University of Manchester scientists, writing in the journal *Nature Geoscience*, have shown that natural emissions and manmade pollutants can both have an unexpected cooling effect on the world's climate by making clouds brighter.

Clouds are made of <u>water droplets</u>, condensed on to <u>tiny particles</u> suspended in the air. When the air is humid enough, the particles swell into <u>cloud droplets</u>. It has been known for some decades that the number of these particles and their size control how bright the clouds appear from the top, controlling the efficiency with which clouds scatter sunlight back into space. A major challenge for <u>climate science</u> is to understand and quantify these effects which have a major impact in



polluted regions.

The tiny seed particles can either be natural (for example, sea spray or dust) or manmade pollutants (from vehicle exhausts or industrial activity). These particles often contain a large amount of organic material and these compounds are quite volatile, so in warm conditions exist as a vapour (in much the same way as a perfume is liquid but gives off an aroma when it evaporates on warm skin).

The researchers found that the effect acts in reverse in the atmosphere as <u>volatile organic compounds</u> from pollution or from the biosphere evaporate and give off characteristic aromas, such as the pine smells from forest, but under moist cooler conditions where clouds form, the molecules prefer to be liquid and make larger particles that are more effective seeds for cloud droplets.

"We discovered that organic compounds such as those formed from forest emissions or from <u>vehicle exhaust</u>, affect the number of droplets in a cloud and hence its brightness, so affecting climate," said study author Professor Gordon McFiggans, from the University of Manchester's School of Earth, Atmospheric and Environmental Sciences.

"We developed a model and made predictions of a substantially enhanced number of cloud droplets from an atmospherically reasonable amount of organic gases.

"More cloud droplets lead to brighter cloud when viewed from above, reflecting more incoming sunlight. We did some calculations of the effects on climate and found that the cooling effect on global climate of the increase in cloud seed effectiveness is at least as great as the previously found entire uncertainty in the effect of pollution on clouds."



More information: Cloud droplet number enhanced by cocondensation of organic vapours, <u>DOI: 10.1038/ngeo1809</u>

Provided by University of Manchester

Citation: Organic vapors affect clouds leading to previously unidentified climate cooling (2013, May 5) retrieved 28 April 2024 from <u>https://phys.org/news/2013-05-vapors-affect-clouds-previously-unidentified.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.