



News

Articles

Videos

Images

Books

Health & Medicine

Mind & Brain

Plants & Animals

Earth & Climate

Space & Time

Matter & Energy

Science News

Share Blog Cite

UC Irvine Researchers Discover How Airborne Sea Salt Particles May Influence Air Pollution Levels

ScienceDaily (Apr. 18, 2000) — Irvine, Calif., April 13, 2000 — UC Irvine researchers who study the chemistry of ocean/air interactions have discovered how airborne sea salt particles may be involved in helping to determine the levels of some greenhouse gases as well as air quality in coastal urban areas.

See also:

Matter & Energy

- [Chemistry](#)
- [Nature of Water](#)
- [Inorganic Chemistry](#)

Earth & Climate

- [Air Pollution](#)
- [Air Quality](#)
- [Pollution](#)

Reference

- [Tropospheric ozone](#)
- [Nitrogen oxide](#)
- [Chemical compound](#)
- [Air pollution](#)

In collaboration with other molecular scientists, Barbara Finlayson-Pitts, a UCI professor of chemistry, and Donald Dabdub, a UCI assistant professor of mechanical and aerospace engineering, have been able to show that sea salt particles—a common ingredient of coastal and ocean air—undergo a previously unrecognized chemical reaction in daylight to release chlorine molecules, which can influence ozone levels in the lower atmosphere.

Their findings appear in the April 14 issue of *Science*. In sunlight, these molecules decompose into highly

reactive chlorine atoms. When these atoms are formed in the presence of pollutants emitted from fossil fuel energy sources such as oil, coal and gasoline, they may lead to the formation of ozone, which is recognized as an air pollutant. Because ozone has documented health effects at quite low levels, both state and federal authorities have established quality standards for this pollutant.

"The ocean is two-thirds of the earth's surface, so to

Related Stories

Ozone Levels In Southern California Smog May Be Higher Than Current Air Quality Models Predict

(Feb. 11, 2003) — Current air-quality models used for predicting air pollution may be underestimating ozone levels in Southern California by as much as 10% of the national one-hour ozone standard, a UC Irvine study ... [> read more](#)



Scientists Find Chlorine May Contribute To Ozone Formation

(Jun. 14, 2006) — Standard methods of predicting air pollution don't take atmospheric chlorine into account, but the chemical could be responsible for 10 percent or more of daily ozone production in local air, ... [> read more](#)

Study: Sea Salt Seasons Chemical Brew That Destroys Arctic Ozone

(Jan. 19, 2001) — Sunlight, snow and sea salt are sometimes used to illustrate Nature at its best. But new scientific evidence shows that, when combined, these forces may provide a potent mixture for destroying ... [> read more](#)

New Understanding Of Sea Salt To Help Climate Modeling

(Jul. 7, 2003) — While a breeze over the ocean may cool beach goers in the summertime, a new scientific study has revealed that tiny sea salt particles drifting into the atmosphere participate in a chemical reaction ... [> read more](#)

Worsening Urban Air Pollution Won't Increase Global Temperature Over Next 100 Years

(Sep. 20, 2000) — Researchers using a new climate change model predict that urban air pollution will increase significantly over the next 100 years, but although it may affect regional temperatures, globally it will ... [> read more](#)

Just In Self-as

Scien



Atmo

Atmo

Envi

Cart

more



Brea

Schi

exhu

poet

Stuc

was

anci

App

needs to be taken into account in assessing levels of greenhouse gases and air pollutants such as ozone in the air."

In this study, UCI researchers observed the reaction of hydroxyl radicals (equivalent to water, H2O, with a hydrogen atom removed) with tiny particles composed of water and sodium chloride—the basis of sea salts. The hydroxyl radical is always present in air. The researchers found unique chemical reactions on the surface of the sea salt particles rather than inside the particles, as had been previously observed. Until now, it was believed that a reaction between hydroxyl and sea salt required that the hydroxyl radical be absorbed into the liquid particle before reacting. It also was believed that chlorine would not be formed unless the particles were acidic. Neither of these two activities was observed in this study. The discovery of hydroxyl reactions on the surface of sea salt particles further suggests that the creation of atmospheric chlorine through sea salt interaction may be greater than previously realized.

"This finding implies that this unique chemistry occurring on sea salt particle surfaces is yet another way of getting chlorine into the air," Finlayson-Pitts said. "Because they're so highly reactive, these chlorine atoms are important in the understanding of the formation and the fate of a number of trace gases vital to global climate issues."

In continuing this research, Dabdub will introduce this information on sea salt chlorine creation into a complex computer modeling program that analyzes and predicts the air quality of the South Coast Air Basin of California—a highly populated coastal area that records some of the highest levels of air pollution in the United States—to see its impact on levels of ozone and other pollutants.

Participating in this study with Finlayson-Pitts and Dabdub are Eladio Knipping of UCI's Department of Mechanical and Aerospace Engineering; Matthew Lakin, Krishna Foster, R. Benny Gerber and Douglas Tobias of UCI's Department of Chemistry, and Pavel Jungwirth of the J. Heyrovsky Institute of Physical Chemistry, Academy of Science in the Czech Republic. The study was funded by the U.S. Department of Energy, the National Science Foundation, the North Atlantic Treaty Organization (NATO) and the UCI Council on Research, Computing and Library Resources.

Adapted from materials provided by [University Of California, Irvine](#).

Need to cite this story in your essay, paper, or report? Use one of the following formats:
© APA University Of California, Irvine (2000, April 18).

air quality in commercial jetliner cabins, scientists from Austria, Denmark and the United States have ... > [read more](#)

Carbon Dioxide Tied To Air Pollution Mortality (Mar. 4, 2008) — Rising carbon dioxide levels from burning fossil fuels have been linked to sea level changes, snowmelt, disease, heat stress, severe weather, and ocean acidification. Yet because it does not affect ... > [read more](#)

UCI Study Uncovers Unexpectedly High Air Pollutant Levels In Southwest States (Oct. 7, 2003) — UCI atmospheric scientists have found that greenhouse gases released from oil and natural gas exploration and processing in Oklahoma, Texas and Kansas create regional air pollution levels similar to ... > [read more](#)

Number of stories in archives: 44,032

of TI
Aust
finds
junk
[more](#)

In Oth

Ex-N
dodg
resiq

Cha
agai
Had

Colc
free
Beta

Puer
gove
inno

One
Texa

Cub
restr
phor

U.S.
miss
cons

Pers
rises
mod

[more](#)

Cop:

Free

Get the
newsle
hourly

[Ema](#)

[RSS](#)

Find with keyword(s):

Enter a keyword or phrase to search ScienceDaily's archives for related news topics, the latest news stories, reference articles, science videos, images, and books.

Have a
Your N
Your E
Comm

Click b

[About This Site](#) | [Editorial Staff](#) | [Awards & Reviews](#) | [Contribute News](#) | [Advertise With Us](#) | [Privacy Policy](#) | [Terms of Use](#)

Copyright © 1995-2008 ScienceDaily LLC — All rights reserved — Contact: editor@sciencedaily.com.

<!-- Cached 29th