Whiter clouds could mean wetter land

Science Video News

Inside The Clouds
Meteorologists analyzing data from a closely-packed group of five satellites have identified a decrease in cloud cover over the Arctic. They find...

Meteorologists Find That Increased Ocean Temperatures Cause Increasingly Intense Hurricanes
Cool Pacific Waters May Not Affect Upcoming Hurricane Season
Climatologists Forecast Completely New Climates

more science videos

Breaking News

Government sues Apollo 14 astronaut over lunar camera
Japan experts design superelastic alloy, may resist quakes
NASA bids farewell to "amazing" relic, the shuttle
Israel to restore section of Dead Sea shore
E.coli seen spawning biofuel in five years

more science news

In Other News ...

Case against Strauss-Kahn near collapse: sources
Venezuela's Chavez says he was treated for cancer
Geithner mulls departing Treasury post: sources
Fed's Bullard: QE effective proxy for rate cuts
Whiter Clouds Could Mean Wetter Land

ScienceDaily (June 29, 2010) — One proposed emergency fix to halt global warming is to seed clouds over the ocean to make them more reflective, reducing the solar radiation absorbed by the Earth. But the scheme could also change global rainfall patterns, raising concerns of water shortages on land. A new study by the Carnegie Institution, in collaboration with the Indian Institute of Science, suggests that altered atmospheric circulation under the scheme in fact could increase monsoonal rains and cause the continents to become wetter, not drier, on average.

See Also:

Earth & Climate
- Environmental Issues
- Global Warming
- Air Pollution
- Water
- Air Quality

Reference
- Precipitation
- Cloud
- Fog
- Solar radiation

To test the climate consequences of doing this, Caldeira and his coauthors used a computer simulation of the global climate system in which atmospheric carbon dioxide concentrations were set at approximately twice that of present day. Cloud droplets over the oceans in the model were reduced in size to make the clouds more reflective. Clouds over land were unaltered. As expected, the whitened clouds reflected more solar radiation and offset the warming effect of the high carbon dioxide levels.

What surprised the researchers, however, was that the model showed that the oceanic clouds caused the land surface to become cooler and wetter on average. In previous climate simulations diminishing solar radiation by geoengineering had reduced precipitation on land. "The drying of the continents has been a major concern with regard to geoengineering," says Caldeira. But in the model the runoff from the continents increased by 7.5% globally, with the effect being strongest in the tropics.

The researchers concluded that the increased precipitation over land was driven by changes in air circulation, similar to the monsoonal pattern that determines rainfall in parts of Asia. "Monsoons occur when air masses over land are warmer than air masses over the ocean, and this draws in cool, moist air from over the ocean which then drops rain over the land," says Caldeira. In the simulations, the reflective oceanic clouds preferentially cooled the air over the oceans relative to land, setting up a monsoonal air flow.

Caldeira stresses that their study, in which all marine clouds worldwide were uniformly whitened, cannot be used to predict the geographic patterns of rainfall that might develop as a result of geoengineering. "In real life, there are only certain parts of the ocean in which you could make the cloud droplets smaller," he says. Areas downwind of land, such as the east coast of the United States, are already laden with particles of dust and pollution, so adding more particles will not significantly change cloud cover. "An actual deployment would be much patchier than in our study, and the result would therefore be somewhat different. But our basic result calls into question previous assumptions about the impact of this geoengineering scheme. It merits further investigation."

Related Stories

- Geoengineering Could Slow Down Global Water Cycle (May 28, 2008) — As fossil fuel emissions continue to climb, reducing the amount of sunlight hitting the Earth would definitely have a cooling effect on surface ... > read more

- Cutting Carbon Dioxide Could Help Prevent Droughts, New Research Shows (Mar. 25, 2011) — Recent climate modeling has shown that reducing the concentration of carbon dioxide in the atmosphere would give the Earth a wetter climate in the short term. New research offers a novel explanation ... > read more

- Global Sunscreen Won't Save Corals (June 26, 2009) — Emergency plans to counteract global warming by artificially shading the Earth from incoming sunlight might lower the planet's temperature a few degrees, but such
The above story is reprinted (with editorial adaptations by ScienceDaily staff) from materials provided by Carnegie Institution.

Journal Reference:


Need to cite this story in your essay, paper, or report? Use one of the following formats:

APA


MLA

Dry Regions Becoming Drier: Ocean Salinities Show an Intensified Water Cycle (Apr. 18, 2010) — There is new evidence that the world's water cycle has already intensified. The stronger water cycle means arid regions have become drier and high rainfall regions wetter as atmospheric temperature ...

Disclaimer: Views expressed in this article do not necessarily reflect those of ScienceDaily or its staff.

Search ScienceDaily

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.

Part of the iVillage Your Total Health Network

Note: This web site is not intended to provide medical advice, diagnosis or treatment.