



- News
 - Articles
 - Videos
 - Images
 - Books
 - Search
-
- Health & Medicine
 - Mind & Brain
 - Plants & Animals
 - Earth & Climate
 - Space & Time
 - Matter & Energy
 - Computers & Math
 - Fossils & Ruins

Science News

[Share](#)
[Blog](#)
[Cite](#)
[Print](#)
[Bookmark](#)
[Email](#)

Just In:
[First Artificial Neural Network out of DNA](#)

Science Video News

Bringing Sunlight Inside
 Photovoltaic panels have a new design: concentric circles that focus the sun's rays on miniaturized modules. Having the panels automatically sense. ... > [full story](#)

- [Atmospheric Scientists Monitor Global Carbon](#)
- [Environmental Engineers Use Algae To Capture Carbon Dioxide](#)
- [Seismologists Devise New Technique To Measure Pollution](#)
- [more science videos](#)



Breaking News ... from NewsDaily.com

- [Atlantis has landed, ending NASA's shuttle era](#)
- [NASA's "Final Four" astronauts close out shuttle era](#)
- [Hubble detects a tiny fourth moon around Pluto](#)
- [U.S. space shuttle spawned heart pump, fly by wire](#)
- [U.S. wants to talk outer space with China](#)



[more science news](#)

In Other News ...

- [Cash records, email suggest Coulson knew of bribes: source](#)
- [Atlantis has landed, ending NASA's shuttle era](#)
- [Jobless claims rise above expectations](#)
- [Morgan Stanley beats second-quarter expectations](#)
- [Express Scripts to buy Medco for \\$29 billion](#)

Geoengineering Could Slow Down Global Water Cycle

ScienceDaily (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 temperatures.

See Also:

Matter & Energy

- Nature of Water
- Energy Policy
- Transportation Science

Earth & Climate

- Environmental Issues
- Water
- Global Warming

Reference

- Scientists regarding global warming
- Solar radiation
- Climate model
- Climate

However, a new study from Lawrence Livermore National Laboratory, led by atmospheric scientist Govindasamy Bala, shows that this intentional manipulation of solar radiation also could lead to a less intense global water cycle. Decreasing surface temperatures through "geoengineering" also could mean less rainfall.

The reduction in sunlight can be accomplished by geoengineering schemes. There are two classes: the so-called "sunshade" geoengineering scheme, which would mitigate climate change by intentionally manipulating the solar radiation on the earth's surface; the other category removes atmospheric CO₂ and sequesters it into the terrestrial vegetation, oceans or deep geologic formations.

In the new climate modeling study, which appears in the May 27-30 early online edition of the Proceedings of the National Academy of Sciences, Bala and his colleagues Karl Taylor and Philip Duffy demonstrate that the sunshade geoengineering scheme could slow down the global water cycle.

The sunshade schemes include placing reflectors in space, injecting sulfate or other reflective particles into the stratosphere, or enhancing the reflectivity of clouds by injecting cloud condensation nuclei in the troposphere. When CO₂ is doubled as predicted in the future, a 2 percent reduction in sunlight is sufficient to counter the surface warming.

This new research investigated the sensitivity of the global mean precipitation to greenhouse and solar forcings separately to help understand the global water cycle in a geoengineered world.

While the surface temperature response is the same for CO₂ and solar forcings, the rainfall response can be very different.

"We found that while climate sensitivity can be the same for different forcing mechanisms, the hydrological sensitivity is very different," Bala said.

The global mean rainfall increased approximately 4 percent for a doubling of CO₂ and decreases by 6 percent for a reduction in sunlight in his modeling study.

"Because the global water cycle is more sensitive to changes in solar radiation than to increases in CO₂, geoengineering could lead to a decline in the intensity of the global water cycle" Bala said.

A recent study showed that there was a substantial decrease in rainfall over land and a record decrease in runoff and discharge into the ocean following the eruption of Mount Pinatubo in 1991. The ash emitted from Pinatubo masked some of the sunlight reaching the earth and therefore decreased surface temperatures slightly, but it also slowed down the global hydrologic cycle.

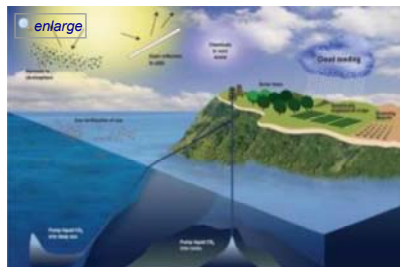
"Any research in geoengineering should explore the response of different components of the climate system to forcing mechanisms," Bala said.

For instance, Bala said, sunshade geoengineering would not limit the amount of CO₂ emissions. CO₂ effects on ocean chemistry, specifically, could have harmful consequences for marine biota because of ocean acidification, which is not mitigated by geoengineering schemes.

"While geoengineering schemes would mitigate the surface warming, we still have to face the consequences of CO₂ emissions on marine life, agriculture and the water cycle," Bala said.

Email or share this story:

[More](#)



A schematic representation of various geoengineering and carbon storage proposals. (Credit: Diagram by Kathleen Smith/LLNL)

Ads by Google

Best in Residential Solar — The Nation's #1 Home Solar Service. Get Started for \$1,000 Today. www.SunRunHome.com

Goodbye High Heating Bill — Central Boiler Outdoor Wood Furnace Heat Entire Home and Save. www.CentralBoiler.com

Vista Solar — Solar Panels that look great Save Money From day One www.rps-solar.com

Solar Power (Pay No \$) — Go Solar for \$0 Down + Save \$1,000! Get A Free No Obligation Quote Now. VerengoSolar.com/Free_Quote

Sustainability Strategy — Recycle Roof Replacement Waste Insist on the Green Option; LEED; NationwideFoam.com

Related Stories

Stratospheric Injections Could Help Cool Earth, Computer Model Shows (Sep. 15, 2006) — A new computer model study shows that a two-pronged approach to stabilizing climate, with cuts in greenhouse gas emissions as well as injections of climate-cooling sulfates into the stratosphere, ... [> read more](#)

Climate Change: Can Geoengineering Satisfy Everyone? (Sep. 20, 2010) — Reflecting sunlight from the Earth by geoengineering would undoubtedly cool the climate, but would different countries agree on how much to reflect? Research by climate scientists in the UK shows ... [> read more](#)

Geoengineering: A Quick Fix With Big Risks (June 6, 2007) — Radical steps to engineer Earth's climate by blocking sunlight could drastically cool the planet, but could just as easily worsen the situation if these projects fail or are suddenly halted, ... [> read more](#)

Atmospheric 'Sunshade' Could Reduce Solar Power Generation (Mar. 16, 2009) — The concept of delaying global warming by adding particles into the upper atmosphere to cool the climate could unintentionally reduce peak electricity generated by large solar power plants by as much ... [> 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 "geoengineering" solutions would do ... [> read more](#)

Ads by Google

No Cost Solar Install — No Up-Front Cost. \$0 Down Lease. Lower or Eliminate Electric Bills! AffordableSolarLease.com

ECB said to accept temporary Greek default in rescue
Global slowdown signs strengthen, debt crisis weighs
China factory sector shows worried
[more top news](#)

AdChoices ▾

Climate Crisis: Truth

Learn the complete truth about the climate crisis. Spread the word. IMF finds world
www.climateallianceproject.org

Underwater Data Logger

Gather Data On Temperature Changes. Fully Submersible - Learn More Now!
www.vemco.com/DataLogger

Free Subscriptions

Get the latest science news with our free email newsletters, updated daily and weekly. Or view hourly updated newfeeds in your RSS reader.
[Email Newsletters](#)
[RSS Newsfeeds](#)

Real Goods Solar Giveaway

Win a Free Home Solar System Enter for your chance to win!
realgoodsolar.com

Feedback

Tell us what you think of ScienceDaily -- we welcome both positive and negative comments. Have any problems using our site? We have a Finance Option for You

Your Name:

Your Email:

Comments:

Solar Contractors

Avoid risks. Use Diamond Certified. Performance is guaranteed to you. DiamondCertified.org/

Click button to submit feedback:

Story Source:

The above story is reprinted (with editorial adaptations by ScienceDaily staff) from materials provided by [DOE/Lawrence Livermore National Laboratory](#).

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

- APA DOE/Lawrence Livermore National Laboratory (2008, May 28). Geoengineering Could Slow Down Global Water Cycle. *ScienceDaily*. Retrieved July 22, 2011, from <http://www.sciencedaily.com/releases/2008/05/080527155519.htm>
- MLA

Note: If no author is given, the source is cited instead.

A1 Sun, Inc. — Lighten your energy footprint. Call for a free site evaluation!
www.a1suninc.com

Download Google Chrome — A free browser that lets you do more of what you like on the web
www.google.com/chrome

Love Science? — Entertaining Science news, interviews, and MORE!
www.skepticality.com

Solar water panel — Solar hot water collector from \$395 Order today! Save energy tomorrow
FirstSolarProducts.com

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

Search ScienceDaily

Number of stories in archives: 106,142

Find with keyword(s):

Search

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.

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

Copyright © 1995-2011 ScienceDaily LLC — All rights reserved — Contact: editor@sciencedaily.com

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

Part of the iVillage Your Total Health Network