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News

Geoengineering can't please everyone

Adding aerosols to the atmosphere will not counter global warming in all regions.

Richard A. Lovett

Attempting to offset global warming by injecting sunlight-reflecting gases into the upper atmosphere isn't the quick fix for global climate change that advocates believe it might be, a new study finds.

In a paper published today in *Nature Geoscience*¹, Kate Ricke, a climate physicist at Carnegie Mellon University in Pittsburgh, Pennsylvania, and her colleagues show, by modelling, that not only could solar-radiation management lead to declines in rainfall in the long term, but its effects will also vary by region. Some places will be over-cooled by atmospheric changes that are too small to be effective for their neighbours.



Releasing sulphates from aeroplanes would not ward off the effects of global warming equally well for all regions of the world.

iStockphoto

The gases under consideration are sulphur compounds that would produce sulphate aerosols in the upper atmosphere. Geoengineering advocates have proposed injecting large quantities of these materials into the stratosphere, either by shooting them up in artillery shells or releasing them from high-flying aeroplanes. Once there, they would disperse into a thin, bright haze that would reflect enough sunlight back into space to partially or completely offset global warming.

“It confirms that it is not possible to control both temperature and precipitation using stratospheric geoengineering.”

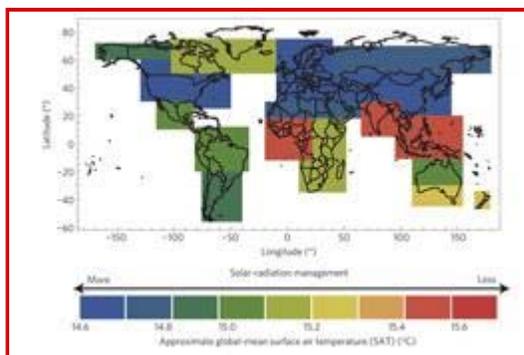
The goal would be to mimic the effects of volcanoes eruptions such as the 1991 eruption of Mount Pinatubo in the Philippines, which blasted enough sulphates into the stratosphere to temporarily reduce the global temperature by nearly half a degree. Geoengineers propose mimicking this on ever-expanding scales, so that increasing levels of greenhouse gases are offset by ever-greater levels of sunlight reduction.

The new study found that it is fairly easy to design sulphate-injection scenarios that keep the temperature stable until 2080. But, unfortunately, the change in sunlight alters other weather patterns. "It changes the distribution of energy in the troposphere so that it becomes more convectively stable," Ricke says. The result: decreasing precipitation.

Temporary fix

Regional effects are also important. For example, Ricke says, her study found that levels of sulphate that kept China closest to its baseline climate were so high that they made India cold and wet. Those that were best for India caused China to overheat. She notes, however, that both countries fared better either way than under a no-geoengineering policy.

The modellers also found that all of these effects get worse with time. "The compensation is imperfect," Ricke says. "The longer you do it, the more imperfect it becomes."



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Ricke, K. L., Morgan, M. G. & Allen, M. R. Nature Geosci.

Thus, she says, this type of geoengineering is at best a temporary fix — something people working in the field had always known because it does nothing to prevent the accumulation of carbon dioxide and the resulting acidification of the oceans. "But it might be even more temporary than people had expected."

Other scientists are impressed. "I think the paper is great," says Ken Caldeira, a climate scientist at the Carnegie Institution for Science's Department of Global Ecology, in Stanford, California. "I offered Kate a postdoc based on these results."

Alan Robock, a geophysicist at Rutgers University in New Brunswick, New Jersey, agrees. "It confirms that it is not possible to control both temperature and precipitation using stratospheric geoengineering," he says.

Cloud computing

The researchers used a global climate model, called HadCM3L, from the Hadley Centre for Climate Prediction and Research in Exeter, UK. To run their simulations, however, they made use of climateprediction.net, a climate-forecasting experiment in which thousands of people volunteer to have their home computers do climate simulations when inactive. "This is something that people can sign up for on home computers that sit idle most of the day," Caldeira says. "When the computer notices it is idle for a while, it starts running climate models."

Caldeira and Robock are impressed by the use of Climateprediction.net, but Caldeira points out that as the team only used one model, some of Ricke's specific findings, such as the details of the India–China disparity, might be model-specific.

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"I don't think climate modelling is at the point where we should trust one single model at that scale," Caldeira says. "But I think the results are robust in the sense that it's the kind of issue that people will need to face. The qualitative idea is that you're going to have differential results in different regions, and that's going to cause people to want different amounts of this stuff up there, if they want any of it up there at all."

Ricke agrees. "We don't intend these results to give a definitive indication of what's going to happen," she says. "It's more an illustration of the type of regional effect you would see."

References

1. Ricke, K. L., Morgan, M. G. & Allen, M. R. *Nature Geosci.* Advance online publication [doi:10.1038/ngeo915](https://doi.org/10.1038/ngeo915) (2010).

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Significantly, health effects and environmental effects are not included in this study. It is **#12116** extremely important to remember scientists have brought us everything from the recent BP disaster, (where were the scientists who should have had a fix, or better still warned about the cataclysmic effects of drilling so deep?), global warming or climate change, health risks of GMOs, thalidomide, and so on and so on. Scientists and the Information-Military Complex must be subject to checks and balances or we have mad scientists, with the latest money making scheme; with our money, and ourselves as the guinea pigs.
jaydayrock

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Posted by: **jay dayrock** | 2010-07-19 10:45:43 AM

@jay dayrock

#12132

Scientists – or more accurately, science – have also brought us the internet, anesthetics, vaccines, television, synthetic fabrics, efficient insulation, DDT (and if you think that's bad, check how many people have died of DDT poisoning, and how many have died of malaria), increased life expectancy,

increased the rate of survival of childbirth, flight, education, the printing press (yes, I think Caxton does qualify as a scientist).

I think your agenda is showing.

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Posted by: **Charles Sanity** | 2010-07-20 11:32:02 AM

did you ask the people of those countries what their opinion on spraying their air was??? **#12133**

"The proles are not human"

Chemtrail "conspiracy theory" (!?)

From Wikipedia, the free encyclopedia

The chemtrail conspiracy theory holds that some contrails are actually chemicals or biological agents deliberately sprayed at high altitudes for a purpose undisclosed to the general public.¹ Versions of the chemtrail conspiracy theory circulating on the internet and radio talk shows theorize that the activity is directed by government officials.² As a result, federal agencies have received thousands of complaints from people who have demanded an explanation.²³⁴

The existence of chemtrails has been repeatedly denied by government agencies and scientists around the world.⁵⁶⁷

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Posted by: **blah blah** | 2010-07-20 11:54:52 AM

Surely the first criterion for any geoengineering proposal is this: Can it be reversed or turned off#**12135** after it has done the job or if/when the the unintended side effects turn out to be worse than the original problem. If it can't, then it is out regardless of any other merits.

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Posted by: **Hilary Gee** | 2010-07-20 12:50:10 PM

Tampering with the Earth's ecosystems is a foolhardy enterprise. The Earth goes through **#12137** thermal cycles as has been PROVEN through ice core and geological studies ... TRUE SCIENCE! So, we're warming up ... stop dumping chemicals on my head! We humans have absolutley NO CONTROL over global warming. Having said that, we do, however, have a direct responsibility in our stewardship of our planet! Humans have no control over global warming. We do have a responsibility to control our polution of our planet! Doomsayers (like Al Gore) be damned! Examine the true, untwisted or slanted data. Poluting our atmosphere will not help but rather harm our planet. Stop mucking around and leave things alone. There are better ways to spend our tax dollars, yes?

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Posted by: **Matthew Levine** | 2010-07-20 01:49:22 PM

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