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# Geoengineering Could Backfire, Make Climate Change Worse

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**Deploying giant space mirrors and spraying particles from stadium-sized balloons may sound like an engineer's wild fantasy, but climate models suggest that the potential of geoengineering to offset rising atmospheric carbon dioxide may be significantly overstated.**

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**Through a variety of computer simulations used for reporting to the Intergovernmental Panel on Climate Change (IPCC), the team investigated a scenario where an increase in the world's atmospheric carbon dioxide levels was balanced by a "dimming" of the sun.**

**Across all four models tested, the team showed that geoengineering could lead to adverse effects on the Earth's climate, including a reduction in global rainfall. They therefore concluded that geoengineering could not be a substitute for the reduction of greenhouse gas emissions.**

However, in a field with divided opinion on geoengineering's potential role in addressing climate change, some doubt the significance of this conclusion. "From a policy standpoint, this doesn't provide very helpful guidance to decision-makers," said Steve Rayner of the Oxford Geoengineering Program. **"No serious player in this field suggests that [geoengineering] could ever be a substitute for mitigation and adaptation."**

The leader of the research, Hauke Schmidt of the Max Planck Institute, Germany, believes their experiment still contributes important details on how the Earth's systems might respond to geoengineering. "The first thing we realized was that we had to 'dim' the sun 25 percent more than expected, in order for the Earth's systems to show a response, which translates to needing more geoengineering than previously thought," says Schmidt.

A reduction in global rainfall is not necessarily an equal one. "It becomes interesting when you look into the regional responses," continues Schmidt. "If you have just a carbon dioxide increase, most models predict a global rainfall increase, but a strong decrease in the Mediterranean and subtropics. But if you try to balance this with geoengineering, these zones shift to Northern Europe, Northern Asia and North America."

There's also the question of how effective these simulations are in recreating real-world deployment of geoengineering. One particular concern is the study's assumption of a quadrupling of carbon dioxide levels. "If it ever gets to that stage, then we have probably passed the point where geoengineering can be useful anyway," says Rayner.

The researchers recognize this level is at the upper end. "But one of the simulations we're running for the next IPCC has more than a quadrupling of CO2," explains Schmidt. "That's called the 'business as usual' scenario, and it's not completely outside what's conceivable."

The team have also run simulations with smaller (and perhaps more realistic) CO2 increases and will publish results in the upcoming months. But they say the extreme CO2 increase in this first scenario helps to identify signals and understand how the system responds. "From the point of view of a climate researcher it is the most interesting scenario," continues Schmidt. "While those who are interested in geoengineering applications may find it unrealistic."

One scientist particularly interested in geoengineering applications is Matthew Watson, leader of the volcano-inspired Stratospheric Particle Injection for Climate Engineering (Spice) project. The government-funded project was investigating the potential effects of spraying solar-reflective sulphates into the stratosphere from a 20 kilometer-high, stadium-sized balloon. However, a scaleddown field test of a smaller balloon spraying water droplets was cancelled due to governance and patent issues.

Now Watson is concerned by the report's conclusions, which he says could be used to suggest that geoengineering research is a waste of time. "Only through combined modelling and field research can we generate the evidence-base for a salient answer on whether climate engineering is a good or bad idea," says Watson. "It's vitally important that scientists are given the space within which to ask and try to answer difficult questions."

To understand different components of the Earth's systems, Schmidt agrees that a few experiments are necessary. "I'm not generally against small-scale field experiments if they help us understand processes in nature," says Schmidt. "But they should obviously be benign, and we should be very careful." **However, small-scale field tests are also limited, Schmidt believes, with climate simulations possibly being the only way to fully grasp the long-term and large-scale climate effects of geoengineering.**

Both options may have their individual limitations, according to Watson. "That small-scale experiments are, by their nature, incomplete is often used as an argument against climate engineering, but that can also be said of models, which are, by definition, imperfect." In addition to large-scale simulations, Watson accepts the need for small, benign and well-governed field experiments in the interim.

Despite the controversy on the best course of action to take, there is agreement between all parties on the need to determine the effects of geoengineering with confidence. But this confidence may perhaps only be found by both peering through simulations to see long-term global effects, and engaging in detailed examination of field tests to assess the practical potential of specific interventions.

Watson says time is short: "Unfortunately, we don't have hundreds of years before climate change really takes hold. So researching climate engineering now is much better than undertaking that effort only when it becomes clear it is necessary." End
*Source: Wired.co.uk*

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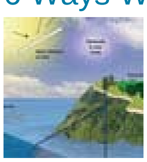

Geoengineering Is 'A Bad Idea Whose Time Has Come'