Can we engineer a cooler earth?

As CO2 mitigation efforts lag, some explore sun-blocking, cloud-forming technologies, and more.

Such projects could also have military applications and as such could violate an existing global treaty that bans altering the climate for hostile purposes, he says. If the effects are salutary in one part of the world, but harmful in another, who decides what will be done? Any scheme also could bring with it unintended consequences and hard-to-quantify costs. Seeding the atmosphere with sulfur particles, for example, is likely to turn the sky whiter. “How do you quantify no more blue skies” as a cost, Robock asks. (One compensation: The number of fiery red and yellow sunsets would increase.)

Scott Wallace

Enlarge

A recent study using computer models showed that putting sun-deflecting mirrors in space would cool the Earth, but wouldn’t return it to the way it was before human-generated global warming began.

“Some places get warmer, some places cool down ... some places get wetter, some places get drier,” says lead author Dan Lunt, a climate modeler at Britain’s University of Bristol. He calls the new climate that would emerge “Sunshade World,” an Earth in which CO2 levels remain high but temperatures are moderated. The closest equivalent to that condition last occurred during the Cambrian period about 500 million years ago, the paper says.

The most talked about proposal would send sulfur or other fine particles high into earth’s atmosphere using airplanes, balloons, or perhaps even artillery shells to block out a tiny fraction of the sunlight. “The aerosol idea frightens people a lot,” Thernstrom says. Sulfur is a pollutant, and studies show it would slightly increase acid rain over the poles. The polar ozone holes would close more slowly, with some ill effects. “But compared to the effects of uncontrolled warming, that’s not that big a concern,” he says.

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Blocking sunlight, adds futurist Cascio, “is at best a delay of the worst temperature-related consequences of global warming in order to give us more time for de-carbonization.”

Any long-term approach to solving global warming, Thernstrom says, almost certainly will have three aspects: emissions reductions, geoengineering, and steps to adapt to an altered climate. “The question is, ‘What is the ratio among those three pieces?’ ”

Schemes to slightly dim sunlight also wouldn’t solve the problem of ocean acidification, caused by airborne CO2 entering seawater. More-acidic oceans would harm coral reefs and upset ocean ecology, with possible far-reaching effects. Ocean acidification is “at least as big” a problem as that of CO2 in the air, Cascio says.

Despite the new buzz around geoengineering, including a recent seminar at AEI, some opponents are adamant. Raymond Pierrehumbert, a professor of geophysics at the University of Chicago, has proposed a 10-year moratorium on research into geoengineering, to ensure humanity isn’t tempted to try this option.

But a new consensus seems to be forming around the idea of stepping up research, even as differences remain over when, if ever, to deploy such schemes. Robock, who maintains strong reservations, also favors research. “We have to know if it’s reasonable or not, how long it might work, what the problems would be, how much it might cost,” he says.

The US government now spends between $2 billion and $3 billion on global warming research, and will probably spend more under the next president. If just $100 million of that over five years were spent on geoengineering research, “We would learn an awful lot,” Thernstrom says.

“The potential payoff is very large. If mitigation doesn’t work, and we have every reason to believe it’s not likely to [work] in the short term,... you kind of want to have a Plan B.”

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