The world needs to explore solar geoengineering as a tool to fight climate change

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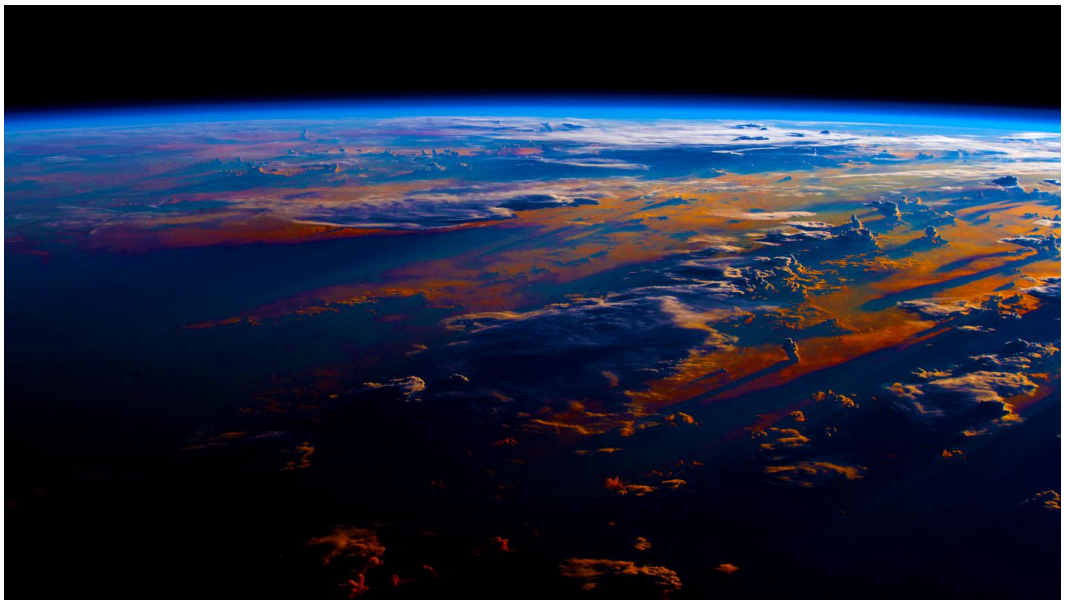

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Solar geoengineering, also called solar climate intervention, is the idea that humans could make the planet a bit more reflective to reduce temperatures and other climate changes caused by accumulating carbon emissions. But at what cost?

A casual observer will read that geoengineering causes droughts, makes weather less predictable, dims the blue sky, and threatens the food supply of billions who depend on monsoon rains. And that's the short list. But is it fair?

A technology's risks depend on how it's used. Antibiotics save lives, but if overused to make cheap beef in feedlots they breed deadly antibiotic-resistant bacteria. As with other technologies, the risks of geoengineering cannot be evaluated without a scenario for goals and governance. Like antibiotics, geoengineering could be deadly if overused.

A worthy goal for solar geoengineering is to slow climate change without making any region worse off. Plausible methods include spraying sea salt into the air to brighten marine clouds or injecting sulfur into the stratosphere to reflect some sunlight back to space. A fairly uniform application of geoengineering across the globe is less prone to make some regions worse off because atmospheric teleconnections mean that a strong localized application may cause unwanted climate changes elsewhere. While there will certainly be harmful impacts of geoengineering under such a scenario, evidence suggests that it would reduce heat waves, extreme storms, and rising seas, and the benefits would greatly outweigh direct physical risks, such as added air pollution. Studies suggest that such geoengineering would increase crop yields, and it would not perceptibly dim the blue sky. And because the benefits of reduced climate change are felt most strongly in the hottest and poorest parts of the world, it would reduce global income inequality.

An Internet search for "geoengineering and drought" turns up thousands of hits, most prominently a Guardian article titled "Geoengineering could bring severe drought to the tropics, research shows." But despite widespread reporting, not a single scientific article demonstrates that geoengineering increases droughts. This disconnect is not confined to the popular press. The only article on geoengineering to make the cover of Nature, the world's most prestigious scientific journal, did so under the headline "Veiled threat." Yet the research article simply showed that geoengineering might not have an effect on crop yields, in contrast to previous research that suggested geoengineering would increase yields.

Why the sharp divergence between media and science? It's driven, in part, by a well-intentioned sense of caution that solar geoengineering will weaken efforts to cut carbon emissions. This is geoengineering's addiction problem, often called its moral hazard. If it encourages more fossil emissions by masking the climate pain they cause, then it is addictive because every ton of extra fossil carbon emissions increases climate risks, thereby increasing the demand for geoengineering to mask the pain.

It's a reasonable fear. Heat waves, storms, and other climate changes grow in proportion to cumulative emissions of carbon. That is to the cumulative amount of coal, gas, and oil that humanity has used since the Industrial Revolution. Solar geoengineering acts quickly and temporarily, but it can only partially reduce climate risk, and it brings risks of its own. Suppose geoengineering were used to stop the rise in global temperatures while fossil fuel burning continued unabated. One would then need to keep increasing the geoengineering dose just to hold temperatures constant against the rising tide of carbon. This path leads to disaster.

Addiction is an apt analogy. Used wisely, morphine is a wonder drug, but using morphine to mask the pain while avoiding the exercise needed to cure it puts one on a path to disaster.

My guess is that many environmental scientists highlight the risks of geoengineering and downplay its benefits out of a well-founded concern of the potential for addiction. Many journalists share these instincts and further amplify this tendency, thus explaining the sharp divergence between media and geoengineering science.

The intentions are good, but the consequences are not. Decision-makers and the public they serve need balanced information about the effectiveness and risks of geoengineering. They are ill-served if the geoengineering's real physical risks are conflated with the equally real political threat that geoengineering will be exploited by fossil fuel interest groups to block the transformation of our energy infrastructure away from carbon.

How to address the political risk of geoengineering addiction? First, the research community working on geoengineering must speak unequivocally about the dangers of the continued reliance on fossil fuels and confront attempts by fossil fuel interests to exploit geoengineering research by falsely arguing that it justifies inaction. More important, policy makers can build governance that links decisions about the implementation of geoengineering to accelerated efforts to cut emissions.

Climate advocates, including the big environmental groups, have generally avoided talk of geoengineering out of concern that it will divert attention from the urgent goal of cutting emissions. With a few exceptions, their strategy has generally been to wish the geoengineering issue away. There are three things wrong with this.

First, it's not likely to go away. Some crude methods of geoengineering could be implemented cheaply with technologies accessible to all but the smallest countries. The likelihood that a coalition of countries facing extreme climate damages will move toward ill-considered deployment of geoengineering grows with the increase in climate risks and the gradual accumulation of knowledge and technological capability. Second, the wish-it-away strategy blocks development of a serious research effort that could reduce uncertainty. Less than 1 percent of climate science funds are focused on geoengineering. Finally, there is the prospect that geoengineering could substantially reduce climate risks for most humans and reduce the net human impact on the natural world.

We must be wary of errors of both commission and omission. The obvious nightmare is that the future possibility of geoengineering slows efforts to stop emissions but that the technology turns out to be infeasible. People are right to fear over-reliance on technofixes. But there's another nightmare: It's that after bringing emissions to zero, we realize in hindsight that early use of geoengineering could have saved millions of lives lost in heat waves and helped preserve some of the natural world. The rise of the antivax movement sadly demonstrates the dangers of prejudice against life-saving technologies.

There are no easy answers. Both errors are possible. But societies have the best chance to make good decisions if they distinguish the very real political risks of geoengineering addiction from the equally real physical risks and benefits of solar geoengineering. It would be crazy to start deploying solar geoengineering today. It's perhaps equally crazy to keep ignoring it. Our children will be better served by a serious international open-access research effort coupled with stronger action to end the world's reliance on fossil fuels.

David Keith is professor of applied physics at Harvard University's Paulson School of Engineering and Applied Sciences and professor of public policy at Harvard Kennedy School.