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Fear of solar geoengineering is healthy - but don't distort our research

David W Keith and Gernot Wagner

Models suggest solar geoengineering could reduce climate change and our independently assessed studies are vital to understanding its full potential

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Even if the world were to cut emissions to zero tomorrow, global temperatures and sea levels would rise [for decades](#). If our roll of the climate dice is [unlucky](#), they could rise for centuries. It is in this context that some climate researchers have begun to reluctantly take seriously ideas [first proposed](#) in the 1960s: the possibility of using solar geoengineering to help restore the world's climate, alongside aggressive actions to reduce greenhouse-gas (GHG) emissions to zero and below.

Fear of solar geoengineering is entirely [healthy](#). Its mere prospect might be hyped by fossil fuel interests to thwart emissions cuts. It could be used by one or a few nations in a way that's harmful to many. There might be some yet undiscovered risk making the technology much less effective in reality than the largely positive story told by computer models.

Yet that healthy fear can distort discussion in unhealthy ways. A reader glancing at [recent coverage](#) in the Guardian, especially [a piece by Martin Lukacs](#), might assume we were capitalistic tools of Donald Trump, eager to geoengineer the planet, democracy and justice be damned.

That reader might miss the fact that the Intergovernmental Panel on Climate Change (IPCC) concluded that, "Models consistently suggest that [solar geoengineering] would generally reduce climate differences compared to a world with elevated GHG concentrations and no [solar geoengineering]", or that many scientists, including the [UK Royal Society](#) and [US National Academy](#), support research. So do many environmentalists, including the [Environmental Defence Fund](#) and the [Natural Resources Defence Council](#).

With all that in mind, we have begun to study solar geoengineering more closely. The emphasis here is on study. It would be reckless to deploy solar geoengineering based on today's limited research.

What makes Harvard's effort different is that we are planning on doing so in an [integrated, multi-disciplinary programme](#) spanning many faculties and points of view. That integrated programme is the context for a proposed outdoor experiment.

Prof [Frank Keutsch](#) and one of us (Keith) are proposing to [fly a balloon](#) about 20km into the air. Its objective is to quantify the microphysics of introducing tiny particles into the stratosphere to improve estimates of the risks and benefits of solar geoengineering in large atmospheric models. It is not a "test" of planetary cooling. The amount of material we would release is tiny compared to everyday activities. For example, if we tested sulphates, we would put less material into the stratosphere than a typical commercial aircraft does in one minute of flight. Our material of

choice for the first flight? Frozen water. Later flights might include tiny amounts of [calcium carbonate](#) or indeed sulphates.

That said, we do not ask anyone to take our word about the safety or legal compliance of the experiment. Risk must be independently assessed, and legal compliance assured, or we will not fly.

Governance of experiments is currently inadequate. To that end, we are seeking advice from Janos Pasztor's [Carnegie Climate Geoengineering Governance Initiative](#), major environmental NGOs, and various other civil society organisations to develop an independent advisory process for the experiment. It's a bootstrap process with the goal of fostering international governance for future experiments. Crucially, we will only proceed with the experiment if doing so does not imperil the long-term ability to develop a solar geoengineering research programme with broad public and stakeholder support.

Facts matter, or at least they should. Friday's Guardian [article](#) implied that the experiment is funded by Bill Gates, but it is not. Gates will in future likely fund the interdisciplinary solar geoengineering research program at Harvard, but his funding will amount to less than 40% of the total, and this experiment is not funded by him. Other funders already include the Hewlett foundation, itself among the largest funders of climate research and advocacy. (Our public [forum](#) this past Friday, in turn, was funded by the Sloan foundation.) It is possible that the broader programme will end up supporting the experiment in later years, but at least through the first flights, the experiment is funded by internal Harvard research funds given to new professors.

Martin Lukacs's [analysis piece](#) is in an entirely different league. It comes after [a similarly biased piece four years ago](#), which severely distorted our proposed experiment. The current piece hypes a link to Trump, but if Trump were to push solar geoengineering while gutting climate science, we believe the only appropriate response is active resistance.

Fear of solar geoengineering is justified. So is fear of the largely unaccounted-for [tail risks](#) of climate change, which make the problem much worse than most realise. Ending fossil fuels will not eliminate climate risks, it just stops the increase of atmospheric carbon. That carbon and its climate risk cannot be wished away.

There is a prudent case for an international, transparent, and sustainable solar geoengineering research programme that includes field experiments with appropriate governance. We [welcome](#) debate on the merits of such a research programme.

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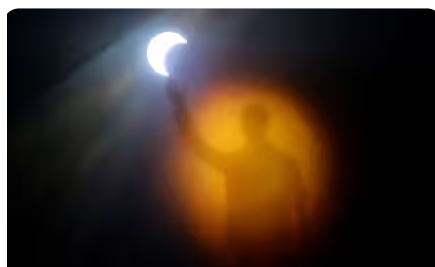
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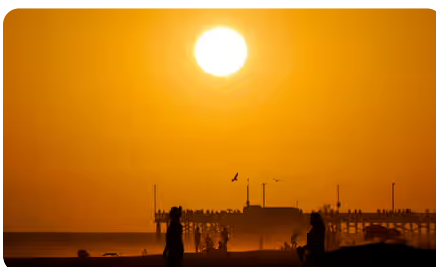
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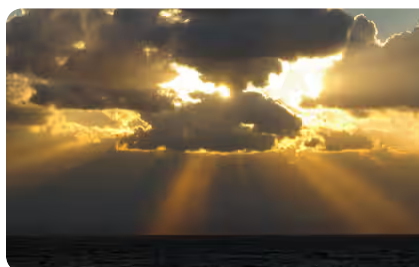
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