There are *strange* things happening in Climate World, in addition to all the *horrifying* things. Among the strangest is a surge in state bills to prohibit solar geoengineering. Just as strange is the recent shot across the bow by Trump's EPA Administrator Lee Zeldin against one tiny startup firm that *claims* to be doing geoengineering. The explanation for why involves chemtrails, cloud seeding, and the populist right and left converging.

First, some background drawing from my previous posts: Solar geoengineering (SG) is a set of technological interventions in the climate system being discussed, which could provide quick, temporary, imperfect relief for severe near-term climate change impacts. The most prominent and promising type of SG is stratospheric aerosol injection (SAI), which would spray a thin mist of bright aerosol droplets in the stratosphere to reflect about 1% of incoming sunlight.

There are 4 things to know about SG:

1. Research suggests it can work, with harmful side effects that are well understood and small relative to the climate harms it would avoid;

2. It can't be a complete climate response – just a stopgap to buy time for permanent solutions like cutting emissions and removing old emissions from the atmosphere, which are off to too late a start to meet the Paris 1.5°C to 2.0°C heating targets;
3. Its biggest problems are political, social, and legal (not scientific or technological): how to navigate and control it; and how not to let it trigger international conflict or destabilization. These are all questions of governance, which are being explored by the Emmett Institute's project on geoengineering governance.
4. No one is doing it. Somewhere between 2 and a dozen major players could probably do it after a decade or so of development. And of course, lots of people seed clouds for small-scale weather modification (which is not the same thing), as they have for 80 years. But no one is doing solar geoengineering. Repeat after me. No one is doing solar geoengineering.

Proposed bans on something no one is doing

Since early 2024, dozens of bills have been introduced in US state legislatures to ban solar geoengineering. Bills have now been introduced in more than 30 states, although only enacted in one (Tennessee) and only passed a single chamber in two more (Arizona and Florida). They have failed in eight states and are in process in the rest.

The bills differ, but they have a lot of precisely parallel language in their core provisions, suggesting they are being promoted by a common source. For example, the core provision of the Tennessee law:

The intentional injection, release, or dispersion, by any means, of chemicals, chemical compounds, substances, or apparatus within the borders of this state into the atmosphere with the express purpose of affecting temperature, weather, or the intensity of the sunlight is prohibited.

Most of these bills include some form of prohibition. Most define the prohibited activity in terms of the release of materials (variously described as "chemicals, chemical compounds, substances, or apparatus" as in the TN language) into the atmosphere of the state. Most limit the prohibition to such release for specific express purposes, typically "…affecting temperature, weather, climate, or the intensity of sunlight" (the South Carolina bill). Some broaden the prohibition to include both direct and indirect release (whatever that means), or to release conducted negligently or recklessly as well as intentionally. Most include no explicit enforcement provision, but a few include criminal provisions. Utah's and Florida's bills both define violations as a 3rd-degree felony, with Florida including penalties up to 5

years imprisonment and provisions for citizen reporting and obligatory official response.

A disruption to the politics of geoengineering

These bills, and the ideological alignments behind them, reflect a sudden disruption to the politics of geoengineering, which has been fairly static for about 15 years, even as the issue gained more attention and climate alarm strengthened. It's not just that no one is doing solar geoengineering: until recently, almost no one has been paying attention to it. The few paying attention have largely fallen into two groups.

First, there are the few hundred folks – mostly scientists, academics and enviros – who are alarmed about climate change and ongoing weakness in emissions cuts, and think SG might eventually help and should be researched, with various reservations that are mostly about control and governance. To be a bit simplistic, this group skews sort-of center-left — naïve, ex-student-council types like me who want competent, evidence-based technical governance and legitimate democratic governance to get along, and who are puzzled and sad that it so often seems they can't.

Second, there are the opponents. These folks skew green, harder-left than the first group, predominantly in the rich industrialized countries. (Think vegans riding bicycles around Kreutzberg.) Relative to the first group, this faction is more led by organized enviro and civil-society groups, mostly grass-roots and membership-driven rather than professionalized, foundation-and-grant-supported. For many, opposition to SG is linked to broader anti-technology, anti-corporate, and anti-colonial stances, with some threads of anti-capitalist, anti-liberal-democracy. Insofar as these folks oppose SG specifically (rather than as a manifestation of techno-optimism, corporate power, and so on), their substantive concerns overlap strongly with those of the first group – how SG would be controlled and governed, whether it would be over-relied on and weaken other responses. But their objections tend to be more categorical, with strong priors that the concerns can't be mitigated, and more confidence that it's still possible to limit climate risks by cutting emissions, with acceptable levels of human suffering and violence – in some cases, more willingness to court these in pursuit of revolutionary social change.

Neither of these two groups advocates for doing SG. The disagreements are all about whether it's OK to research it. That has put the professional enviro groups in an awkward position, starting with the statement opposing SG by the Climate Action Network International in 2019, from which three distinguished US environmental groups — the Natural Resources Defense Council, Environmental Defense Fund, and Union of Concerned

Scientists — dissented in part in affirming the need to responsibly pursue research.

The most surprising thing about the politics of SG has been the third group, or rather the absence of the third group: the non-barking dog. Both the supporters and opponents of SG research worry about fossil fuel interests pushing to develop and use SG, and to over-rely on it, to keep the fossil party going longer. These interests have consistently and effectively resisted emissions-cutting policies, but they have been eerily silent on SG. It's a mystery, on which I have a guess. There is some relevant research evidence on whether knowing about SG weakens support for mitigation. It's on individuals, so not well-targeted to predict political outcomes with interest-group mobilization. But what it mostly shows, contrary to initial intuition, is that knowing more about SG is at least as likely to strengthen mitigation support as weaken it. Speculating why that happens, it may be that when people learn about SG their reaction is, "You're thinking of doing WHAT???? OMG, climate change must be even worse than I thought. All hands on deck," or some such. My theory about the silence of the fossils is that they read the research, and thus think that greater attention to SG will not make their lives easier. This may not last, of course. It's plausible that they'll get religion about SG whenever pressure to cut emissions starts to hurt them – and conversely, one thing that their silence on SG tells you is that pressure to cut hasn't hurt them yet. But we really don't know.

Recently the politics of SG has grown stranger. Most notably, grassroots opposition to SG got tied up with the chemtrails conspiracy theory — the belief that someone is spraying chemicals from airplanes for some nefarious reason, and that the white lines in the sky behind airplanes prove it. Somewhat more than 10% of Americans believe this, with a wide range of beliefs on who does it, what they're spraying, and why. Belief in chemtrails is older than significant interest in SG, although the earliest scientific statements about SG are older still. But when they discovered that a bunch of people were earnestly proposing we might want to spray aerosols in the stratosphere to lessen climate change, it was a match made in heaven. So, SG became a major focus, providing evidence that what they're talking about is real. Chemtrails might have been first, but several other political and ideological strands that skewed libertarian-right – anti-Vax, anti-fluoridation, anti-experts-telling-us-what-to-do – got a boost from populist reaction against public-health controls during COVID (which did sometimes over-reach) and converged with the populist green left. This brings us back to the state anti-SG bills, which are channeling long-standing chemtrail concerns and images to prohibit solar geoengineering, in a convergence between the anti-vax populist right and anti-geo populist left. Holly Buck has an astutely observed analysis of this convergence. The convergence is not just about SG. The main site that appears to be promoting the state bills, "Zero geoengineering," features links to several other "Zero"

sites, including “Zero GMO,” “Zero 5G,” and “Zero compulsory vaccination” (and also sells merch).

Storm clouds ahead

This convergence has a political problem, which the state bills are exposing. This merger of populist right and left hates conventional, small-scale weather modification, aka cloud seeding, as well as SG, and the bills that are broadly drafted. All those that prohibit release of any material for the broad set of purposes as in the Tennessee and South Carolina bills quoted above (“affecting temperature, weather, climate, or the intensity of sunlight”) would prohibit cloud seeding along with SG.

As I discussed in my post on MTG’s “they can control the weather” comment, these things are really different. Effective solar geoengineering using stratospheric aerosols: 1) Would slightly reduce climate change, with effects lasting a year or so after you stop; 2) Would have to be done up high, well into the stratosphere, requiring modified airplanes and engines to do at low and mid latitudes where it appears to work best (The stratosphere starts about 10 km up at the poles, 18 km near the equator); 3) Would affect climate everywhere, so the main problems for law and policy are international; 4) Looks promising based on research, but is not being done.

Cloud seeding: 1) Aims for immediate weather effects; 2) Acts locally, from clouds to fronts; 3) Is highly local in its politics, with farmers and other weather-dependent activities wanting it; 4) Has been routinely practiced for 80 years.

These anti-SG bills are thus likely to run into a wall of opposition in the dry western states, many of which do cloud seeding. Several of them even appropriate state funds to support weather modification. And in several such states, amendments are starting to appear, which mostly narrow the prohibited aims to just “solar radiation management,” defined to include “injection of stratospheric aerosols that increase atmospheric reflectivity or decrease the intensity of sunlight.” This is an appropriate definition if the aim is just to stop solar geoengineering, but the promoters of the bills are not happy. It will be interesting to watch the coming collision between the symbolic and ideological policies (where right and left have converged) and the material politics of western water – which is dominated by the pseudo-libertarian right, with not one bit of convergence with the green left.

Of all the pollution to target

Which brings us back to the strangest piece of the story: Lee Zeldin's threatening move against the tiny firm, "Make Sunsets." Make Sunsets is the two-person firm that provoked a brief political firestorm in Mexico two years ago, when it came out that they were operating from Baja California without permission. They release weather balloons containing small amounts of sulfur dioxide (SO_2), from a few hundred grams to a kilogram or two. The balloons rise to the stratosphere, where they burst and release the sulfur. Their business is selling online "cooling credits," for $5 per gram, based on the approximation that one gram of S in the stratosphere offsets the instantaneous heating effect of one ton of CO_2 in the atmosphere – which it does, although the S comes down in a year or so, while the CO_2 stays for thousands of years. What they're doing presents no risk, because the pollution they release is so insignificant; and no benefit, because it can't scale remotely near the billion-fold larger injections needed to have a material impact on climate change. Rather than SG, what they're doing is better considered something between guerrilla environmental theatre and a new way to separate gullible people online from their money. Nobody concerned with making a difference about climate change or SG should pay any attention to them.

But Lee Zeldin is paying attention. His letter demanded detailed documentation of every launch, including the altitude reached and material released. I'm guessing they don't have that information, because they started as a completely seat-of-the-pants operation. Photos of early launches show them roasting elemental sulfur on a barbecue to produce the SO_2, and directing it through a vacuum cleaner hose to the balloon. On the other hand, they seem to have tightened up since moving the operation from Mexico to the US. They are now meeting the limited reporting obligations under the US Weather Modification Reporting Act, and provide reports on each launch.

Why is Zeldin doing this, aside from the fact that they're an easy target? My guess is that attacking these guys feeds the chemtrailers and anti-vaxxers in the base, plus pretending to be attacking a polluter might give a nice distraction from all the environmental destruction they're doing elsewhere, and so help a little with their attempts to pave the way for fossil expansion.

So, what does this all add up to?

The anti-SG bills don't directly harm the prospects for the needed adult conversation on SG, because if anyone ever wants to do SG they can do it virtually anywhere — or at least anywhere at the desired latitudes — so banning it in these states doesn't matter. They could

do indirect harm by further contributing to the environment of misinformation and fear that surrounds SG — although there may still be a small upside in the belated adjustments being made to the bills, in that better understanding of the difference between SG and weather modification would be a real, if small, contribution to a more informed debate.

As for the EPA attack on Make Sunsets — if it goes anywhere, since there are so many random moves — it's perilous to predict, but it's possible that the attack might identify anti-geoengineering with the populist right, which might lead some of the anti-geo folks on the green left to reconsider. Small grounds for hope, I grant you, but it might contribute to a small move toward a rational conversation about climate risks and how to reduce them.

The Emmett Institute is a co-sponsor of The Degrees Global Forum, the largest conference to date on solar radiation modification, taking place in Cape Town from May 12-16.