

By prohibiting solar geoengineering experiments, Mexico sets a global example of precaution

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By Laura Dunn, Editor of Geoengineering Monitor

The Mexican government recently announced that it will not permit solar geoengineering experiments and will go so far as to stop geoengineering experiments in the country, if necessary. This decision followed two experiments by the U.S.-based start-up, Make Sunsets, which is using Baja California Sur, Mexico to test and deploy solar geoengineering technology.

With this decision, Mexico sets an example for the rest of the world by adhering to the precautionary principle to protect communities and the environment. The announcement refers to Mexico's responsibilities as a party to the UN Convention on Biological Diversity and its 2010 moratorium against the deployment of geoengineering. It also mentions the Montreal Protocol to protect the ozone layer as part of the basis for their decision.

Make Sunsets responded by stating that it will cease operations in Mexico but co-founder Luke Iseman is keen to continue the experiments. In an interview with Time Magazine, Iseman said, "if someone, somewhere in the world wants to launch a balloon with us, I hope they reach out," he says. "And if they are a government, I will bend over backward to be on the next plane to visit them."

Who is behind these experiments?

One of Make Sunsets' co-founders is Luke Iseman, a former director at the Silicon Valley tech incubator Y-combinator, the other is Andrew Song, who along with Iseman helped raise \$750,000 from crypto venture capitalist Boost VC and Pioneer Fund and their family and friends. The company has a strong focus on public relations, kicking off their project with a billboard in New York's Times Square and announcing a promotion that offered ten tons of CO2 equivalent offset in 'cooling credits' for anyone who took a selfie with the digital billboard and posted it on Twitter. They even conducting initial test flights before the company was incorporated.

The experiments came only months after reading Neal Stephenson's book, Termination Shock. In an interview with

the Challenging Climate [podcast](#), the co-founders also claim they “are working off our reading of the literature available of Professor David Keith and Wake Smith [Harvard University researchers]”. With this inspiration, they decided to [move their equipment](#) from Oakland, California to Baja California Sur, Mexico and launch two unauthorised test flights (>10g of sulfur).

Who is funding it?

Solar Geoengineering research is primarily funded by private climate-finance investors, especially in the United States. Major investors in Solar Geoengineering includes billionaire Dustin Moskowitz, former hedge fund trader Holden Karnofsky and Bill Gates, founder of Microsoft. For climate investors, solar geoengineering is a convenient tool that can both facilitate incremental market-driven climate solutions and protect the value of fossil fuel stocks by delaying a transition to clean energy.

Boost VC is an early-stage venture capital firm with \$200m that claims to accelerate a Sci-Fi future describing itself to be “investing in crypto, virtual reality, augmented reality, AI, Ocean Tech, Space Tech, human augmentation, exoskeletons and more”. In the blog post “[Why We Invested](#)”, Adam Draper, Managing Director of Boost VC, states that “they hope Make Sunsets shows the next generation of climate tech founders to be bold. To default to action and attempt to make a real difference. Every industry needs rapid experimentation and that is something that has been lacking in the climate world.”

Pioneer Fund is a fund of 300+ Y Combinator alumni investing in the top companies of Y Combinator and the program’s Venture Partner network. On its website, it considers Luke Iseman as a “Senior Venture Partner”. Y Combinator is an American technology startup accelerator that has been used to launch more than 3,000 companies. Luke Iseman served as the Director of Hardware at Y Combinator. Y Combinator has recently put out a request for start-ups interested in more geoengineering approaches such as Enhanced Weathering and Genetically Engineering Phytoplankton.

What are their methods?

Make Sunsets has been using weather balloons and sulfur, purchased from Amazon to conduct the test flights. In January 2023, they [plan to fly three more balloons](#) where each launch could include 10g-500g of sulfur. Make Sunsets falsely describes its SAI deployment as “creating biodegradable shiny clouds” that mimic natural processes. Make Sunsets undertook this project with full awareness and advantage that there is no legislation to stop Solar Geoengineering research and deployment and that it was only a controversial topic in stagnant discussion.

Despite being from the USA, Make Sunsets has claimed that they decided to launch the flights from Mexico because “launching in/near the tropics has a greater cooling per gram”. Luke Iseman has shared that he is “focused on creating even at this test scale, as much cooling as quickly as [he] responsibly can” and references a [presentation](#) by Matthew Tooher (University of Saskatchewan, Canada) and a [paper](#) by Simone Tilmes et al. (affiliates of Harvard Solar Radiation Management Programme). Luke has shared that it turned out convenient for him to launch in Mexico as he “spends 4+ months/year in Baja, intending to be based here and owns the land”.

What are ‘cooling credits’?

Make Sunsets has designed a commercial business model that imitates the already deeply flawed carbon markets – selling ‘cooling credits’ at \$10 for 1 gram of (sulfur dioxide, SO₂) “clouds”. They falsely claim that they “are able to offset CO₂ at <1% of the cost of other solutions” and “can offset warming from all global annual CO₂ emissions

with ~\$30 million of our clouds, and every \$1 billion of our clouds will cool the world by ~0.1°F!". They have already promoted the sale of larger quantities for companies to 'offset' their carbon emissions as "the fastest way to achieve your company's net-zero goals", offering to deploy amounts of 1000 - 1M tonnes of SO₂.

Make Sunsets claims that the technique is "really effective" where "1 gram of their "clouds" offset the warming of 1tCO₂ emissions/year". Make Sunsets has cited David Keith as a leading researcher and misconstrued his estimate that "a gram of aerosol in the stratosphere, delivered perhaps by high-flying jets, could offset the warming effect of a ton of carbon dioxide, a factor of 1 million to 1" as evidence for their claim that the test flights can offset warming. Luke Iseman has admitted that he has no way of knowing if the balloons launched in December reached the stratosphere or if they released the sulfur.

What is the risk?

The free-for-all and profit-driven nature of this project could also motivate more actors to deploy the technology in a rogue and undisclosed manner, which would be difficult to track for international regulatory governance and scientific bodies. It could also unintentionally motivate independent weaponization of solar geoengineering, in addition to the geopolitical military uses already discussed as a risk. Make Sunsets has already offered to help others set up launch programs.

Opening the door to experiments risks that pro-geoengineering scientists will accelerate their research bringing the world closer to a situation where widespread deployment is a reality despite the threat it poses to humanity and nature.

Already, geoengineers are using the Make Sunsets experiments as an opportunity to mark their territory as the ones proceeding 'safely', despite the dangerous nature of the technology beyond the control and infrastructure of researchers.

The case for more research is flawed - if we were to deploy, "the current global governance system is unfit to develop and implement the far-reaching agreements needed to maintain fair, inclusive, and effective political control over solar geoengineering deployment." as highlighted by the International Solar Geoengineering Non-Use Agreement. With more research, more actors could justify attempting to unilaterally deploy the technology - increasing risks of 'Termination Shock' and other causes for extreme weather as it's evidenced that the technology could cause droughts and floods in other parts of the world.

For those who advocate for the 'governance' of geoengineering, the Make Sunsets experiments can be used to justify creating a framework for geoengineering. This could become just another step towards deployment since governance projects open the door to powerful countries making centuries-long decisions that would impact the whole planet. Instead, the Hands Off Mother Earth Alliance has called for a complete ban on solar geoengineering.

Dr Kevin Surprise of Mount Holyoke College tweeted: "Since Make Sunsets continues to generate headlines, [it's] worth remembering that Silicon Valley ethos and \$ are a feature of the SRM world, not a bug, actively cultivated by the likes of Harvard, SilverLining, and their funders. This recklessness is a logical outcome of a process started by "responsible" researchers, which should serve as a lesson: implementation will be out of the hands of any well-intentioned researcher or governance framework. In this case, it's idiotic tech bros, in future, it will more likely, and more seriously, be the military."

Make Sunsets can be compared to other rogue geoengineering projects like Russ George's ocean fertilization experiments in Haida territories and Leslie Field's work with the [Arctic Ice Project](#). Today, Russ George has started new ventures, continuing with ocean fertilisation experiments in [Alaska](#), New England and Madagascar under the name of Ocean Pasture Restoration. Now, Leslie Field coordinates the Bright Ice Initiative, launched in February 2022, with plans to attempt new tests at the Chhota Shigri Glacier, in the Indian Himalayas (near Manali, Himachal Pradesh). Both ocean fertilisation and the Bright Ice Initiative's form of solar radiation management are considered as marine geoengineering and are being [evaluated by the International Maritime Organisation's London Convention/London Protocol \(LC/LP\)](#).

While geoengineering researchers have been quick to criticise Make Sunsets, it is crucial to remember that geoengineering advocacy and research have created the conditions for this outcome.

The existence of Make Sunsets shows how easy it is for someone to take action based on speculative ideas and well-funded dominant pro-geoengineering narratives and activities around them.

Press release translated from Spanish via [DeepL](#)

Secretaría de Medio Ambiente y Recursos Naturales | January 13, 2023 | Press release

Experimentation with solar geoengineering will not be allowed in Mexico: Semarnat and Conacyt will carry out actions in accordance with the precautionary principle to protect communities and the environment.

- Studies show negative impacts due to the release of these aerosols and that they cause meteorological imbalances.
- There is an international moratorium still in force against the deployment of geoengineering.

In order to prohibit and, if necessary, stop solar geoengineering experimentation practices in the country, the Mexican Government, through inter-institutional coordination between the Ministry of Environment and Natural Resources (Semarnat) and the National Council of Science and Technology (Conacyt), will carry out actions in accordance with the precautionary principle to protect communities and the environment.

The United Nations Convention on Biological Diversity, to which Mexico is a party, established a moratorium in 2010 that is still in force against the deployment of geoengineering.

Opposition to these climate manipulations is based on the fact that there are currently no international agreements

that address or supervise solar geoengineering activities, which represent an economically advantageous way out for a minority and risky for the supposed remediation of climate change.

Therefore, Semarnat will implement a strategy to prohibit these practices within the national territory, which will serve to strengthen the first references worldwide. Under the precautionary principle and the bases established in the Montreal Protocol, which promotes the protection of the ozone layer and the fight against climate change, any large-scale practice with solar geoengineering in its territory will be stopped, which are presumed to be large-scale technologies, but are still under development.

Conacyt will coordinate with experts to review existing rigorous scientific research to expose the serious risks that solar geoengineering practices pose to the environment, people and their community environments.

In addition, we are working to make available to the general public relevant information on the issue of geoengineering that has been promoted in recent years by companies, scaling up investments so that, without scientific support, they are perceived as alternative technologies to address the impacts of climate change.

Solar geoengineering practices seek to counteract the effects of climate change through the emission of gases into the atmosphere such as sulfur dioxide, aluminum sulfate, among others. This process induces the reflection of the sun's rays back into space, thus preventing the increase of temperature in a specific geographical area.

However, there are enough studies that show that there would be negative and unequal impacts associated with the release of these aerosols, which cause meteorological imbalances such as winds and torrential rains, as well as droughts in tropical areas; in addition to generating impacts on the thinning of the ozone layer of the planet.

Recently in the state of Baja California Sur, the Startup Make Sunsets, conducted technical experiments of this type, launching weather balloons with sulfur dioxide, without prior notice and without the consent of the Government of Mexico and the surrounding communities. In the blog of the Make Sunsets website, the company states that it does not know the results of the experiment, since the balloons were not monitored or recovered.

The Government of Mexico reiterates its unwavering commitment to the protection and welfare of the population against practices that generate risks to human and environmental safety, working in a coordinated, rigorous and responsible manner for the welfare of the people of Mexico.