

Comment on NOAA's Petition for Rulemaking on Weather Modification Reporting Docket Number: NOAA-OAR-2024-0091

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How NOAA should update 15 CFR part 908 reporting requirements to account for solar radiation modification experiments?

Solar radiation management (SRM), stratospheric aerosol injection (SAI), marine cloud brightening (MCB), and cirrus cloud thinning (CCT) reporting of field experiments or large scale deployment should not be permitted under the Weather Modification Reporting Act of 1972, Public Law 92-205 and 15 CFR Part 908, due to public opposition, [1][2] danger to human health, [3] weaponization, [4] and numerous unknown effects on weather and climate. [5] By allowing the reporting of geoengineering, NOAA and the Department of Commerce are tacitly stating that persons [6] are legally able to conduct geoengineering field experiments or large-scale deployments simply by filing a NOAA form 17-4 and 17-4a.

What reporting requirements NOAA should include regarding potential and/or measured environmental impacts of weather modification experiments given the state of the science and current detection capabilities?

Solar radiation management is not weather modification, although legally falling under the definition in PL 92-205, [7] however attempts to alter the albedo of the stratosphere or clouds will alter weather (specifically rainfall patterns and temperature) on regional or global scales depending on the size of deployment. [8][9] Due to the nature of geoengineering chemical processes in the atmosphere, the area of impact is unknown and manufactured changes in albedo are undetectable with current state of the art atmospheric sensors. [10]

What spatial scale of weather modification experiments and their intended effects for which NOAA should request in submitted reports?

Solar radiation management field experiments should be banned based on the concerns of trans-national effects of these experiments because there is no scale small enough that may not lead to international conflict over experimentation by SRM activities. [11] Allowing for-profit companies or persons to legally experiment with temperature altering solar geoengineering is a slippery slope that should not be permitted under this petition.

Whether, under existing statutory authorities, NOAA should pursue a broader regulatory strategy for solar radiation modification research and experimentation?

NOAA should pursue a permanent ban on “private, institutional, and federal solar radiation modification (SRM) activities” as this is not a “local weather modification” issue. SRM by definition would be a violation of Environmental Modification Convention (ENMOD) Treaty: “Each State Party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party.” [12][13] We can say with certainty that stratospheric aerosol injection is long lasting, will change rainfall patterns worldwide, and international governance of geoengineering is currently stalled at the United Nations Environmental Assembly (UNEA) due to concerns from the international community. [14]

Summary

This petition for rulemaking was filed directly as a result of Make Sunsets releasing balloons filled with sulfur in an attempt to sell cooling credits for solar radiation modification. [15][16]

Make Sunsets, Inc. was founded in October 2022. In April 2022, the founders of Make Sunset conducted their first unauthorized test flights from Baja California Sur, Mexico, even before the company was incorporated. More balloons were launched from the same site in December 2022, and the company announced at least three more balloons for early 2023, but had to stop them in January 2023 due to a **ban by the Mexican government**. [17][18]

Their actions in La Ventana, Baja, California led to a geoengineering ban by the government of Mexico in accordance with the precautionary principle set forth in the geoengineering moratorium of the Convention of Biological Diversity (2010) and reaffirmed in 2016. [19][20]

I urge NOAA to consider following the lead of our Mexican neighbors and ban solar radiation modification experimentation until an international consensus on the risks associated with SRM can be determined and agreed upon.

REFERENCES

[1] "We Call for an International Non-Use Agreement on Solar Geoengineering." Solar Geoengineering Non-Use Agreement.

<https://www.solargeoeng.org/non-use-agreement/open-letter/>

[2] "Opposition to geoengineering: A timeline." Geoengineering Monitor.

<https://www.geoengineeringmonitor.org/resistance>

[3] Keith, David. "So if I made a decision, or if there was a collective decision to do a geoengineering program, and you put say, the kind of program I think makes more sense, you put about a million tons of sulfur per year (in the stratosphere), **you might end up killing many tens of thousands of people a year as a direct result of that decision.**" Geoengineering Debate (2013)

<https://www.youtube.com/watch?v=fSCHLwJHwVM&t=4217s>

[4] "Key reasons to oppose geoengineering." Geoengineering Monitor. (2024)

<https://www.geoengineeringmonitor.org/reasons-to-oppose>

[5] Robock, Alan. "Stratospheric Sulfur Geoengineering - Benefits and Risks." 21st Conference on Planned and Inadvertent Weather Modification, American Meteorological Society 98th Annual Meeting (2018).

<https://ams.confex.com/ams/98Annual/webprogram/Paper332066.html>

Benefits	Stratospheric Geoengineering	Risks or Concerns
<ol style="list-style-type: none"> 1. Reduce surface air temperatures, which could reduce or reverse negative impacts of global warming, including floods, droughts, stronger storms, sea ice melting, and sea level rise 2. Increase plant productivity 3. Increase terrestrial CO₂ sink 4. Beautiful red and yellow sunsets 5. Unexpected benefits 6. Prospect of implementation could increase drive for mitigation 	<p><u>Physical and biological climate system</u></p> <ol style="list-style-type: none"> 1. Drought in Africa and Asia 2. Perturb ecology with more diffuse radiation 3. Ozone depletion 4. Continued ocean acidification 5. May not stop ice sheets from melting 6. Impacts on tropospheric chemistry 7. Rapid warming if stopped <p><u>Human impacts</u></p> <ol style="list-style-type: none"> 8. Less solar electricity generation 9. Degrade passive solar heating 10. Effects on airplanes flying in stratosphere 11. Effects on electrical properties of atmosphere 12. Affect satellite remote sensing 13. Degrade terrestrial optical astronomy 14. More sunburn 15. Environmental impact of implementation <p><u>Esthetics</u></p> <ol style="list-style-type: none"> 16. Whiter skies 17. Affect stargazing <p><u>Unknowns</u></p> <ol style="list-style-type: none"> 18. Human error during implementation 19. Unexpected consequences <p><u>Governance</u></p> <ol style="list-style-type: none"> 20. Cannot stop effects quickly 21. Commercial control 22. Whose hand on the thermostat? 23. Societal disruption, conflict between countries 24. Conflicts with current treaties 25. Moral hazard - the prospect of it working could reduce drive for mitigation <p><u>Ethics</u></p> <ol style="list-style-type: none"> 26. Military use of technology 27. Moral authority - do we have the right to do this? 	<p>Can be addressed by GeoMIP and other climate modeling</p>
<p>Robock, Alan, 2008: 20 reasons why geoengineering may be a bad idea. <i>Bull. Atomic Scientists</i>, 64, No. 2, 14-18, 59, doi:10.2968/064002006.</p>		
<p>Robock, Alan, 2014: Stratospheric aerosol geoengineering. <i>Issues Env. Sci. Tech.</i> (Special issue "Geoengineering of the Climate System"), 38, 162-185.</p>		
<p>Robock, Alan, 2016: Albedo enhancement by stratospheric sulfur injection: More research needed. <i>Earth's Future</i>, 4, 644-648, doi:10.1002/2016EF000407.</p>		

[6] "Person. Any individual, corporation, company, association, firm, partnership, society, joint stock company, any State or local government or any agency thereof, or any other organization, whether commercial or nonprofit, except where acting solely as an employee, agent, or independent contractor of the Federal government." Public Law 92-205. United States Government Publishing Office (GPO).

<https://www.govinfo.gov/content/pkg/STATUTE-85/pdf/STATUTE-85-Pg735.pdf>

[7] "The term 'weather modification' means any activity performed with the intention of producing artificial changes in the composition, behavior, or dynamics of the atmosphere." Public Law 92-205. United States Government Publishing Office (GPO).

<https://www.govinfo.gov/content/pkg/STATUTE-85/pdf/STATUTE-85-Pg735.pdf>

[8] "Briefing Note 3, Decision-making for geoengineering: Why will it be challenging?" Integrated Assessment of Geoengineering Proposals (IAGP) (2015).

http://www.iagp.ac.uk/sites/default/files/IAGP_Briefing_Note_3.pdf

[9] Wan, J.S., Chen, C.C., Tilmes, S. et al. "Diminished efficacy of regional marine cloud brightening in a warmer world." Nat. Clim. Chang. (2024).

<https://doi.org/10.1038/s41558-024-02046-7>

[10] Seidel, D. J., G. Feingold, A. R. Jacobson, and N. Loeb, 2014: "Detection limits of albedo changes induced by climate engineering." Nature Climate Change, 4, 93-98. doi:10.1038/NCLIMATE2076

https://www.arl.noaa.gov/wp_arl/wp-content/uploads/documents/JournalPDFs/SeidelEtal.NatureClimateChange2014.nclimate2076.pdf

[11] Irvine, P. J. "SRM geoengineering: how to deal with the losers?" Ken Caldeira's Geoengineering Google Group (2010).

<https://groups.google.com/d/msg/geoengineering/ipdLpbnXHeU/tAXDtadrNR0J>

[12] "The Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques." Weather Modification History. <https://weathermodificationhistory.com/environmental-modification-convention-enmod-weather-warfare-ban/>

[13] Banerjee, Bidisha. "ENMOD Squad: Could an obscure treaty protect developing countries from geoengineering gone wrong?" Slate (2010).

<https://slate.com/technology/2010/09/could-an-obscure-international-treaty-protect-developing-countries-from-geoengineering-gone-wrong.html>

[14] "Withdrawn resolution on solar geoengineering at UNEA-6 is a "victory for common sense", says HOME! Alliance." Geoengineering Monitor (2024).

<https://www.geoengineeringmonitor.org/unea6-home-pr>

[15] Hester, Tracy. Bookbinder, David et al. "Petition for Rulemaking to Amend the National Oceanographic and Atmospheric Administration's Reporting Regulations Under the Weather Modification Reporting Act."
<https://weathermodificationhistory.com/downloads/noaa-solar-geoengineering-petition-2024-03-12.pdf>

[16] "Mexico Bans "Make Sunsets" Rogue Geoengineering." Weather Modification History (2022).
<https://weathermodificationhistory.com/mexico-bans-make-sunsets-rogue-geoengineering/>

[17] "Make Sunsets." Map, Geoengineering Monitor (2023).
<https://map.geoengineeringmonitor.org/srm/make-sunsets>

[18] "Experimentation with solar geoengineering will not be allowed in Mexico." Ministry of Environment and Natural Resources, Government of Mexico (2023).
English: https://www.gob-mx.translate.goog/semarnat/prensa/la-experimentacion-con-geoingenieria-solar-no-sera-permitida-en-mexico? x tr sl=es& x tr tl=en& x tr hl=en& x tr_pto=wapp
Original: <https://www.gob.mx/semarnat/prensa/la-experimentacion-con-geoingenieria-solar-no-sera-permitida-en-mexico>

[19] "Climate-related Geoengineering and Biodiversity." COP10 Decision, Convention on Biological Diversity (2010)
<https://www.cbd.int/climate/geoengineering>

[20] "UN Convention still says "No" to manipulating the climate." Geoengineering Monitor (2016).
<https://www.geoengineeringmonitor.org/un-convention-still-says-no-to-manipulating-the-climate>

Additional Information

Surprise, Kevin, and J. P. Sapinski. ["Economic interests and ideologies behind solar geoengineering research in the United States."](#) Solar Geoengineering Non-Use Agreement (2022).

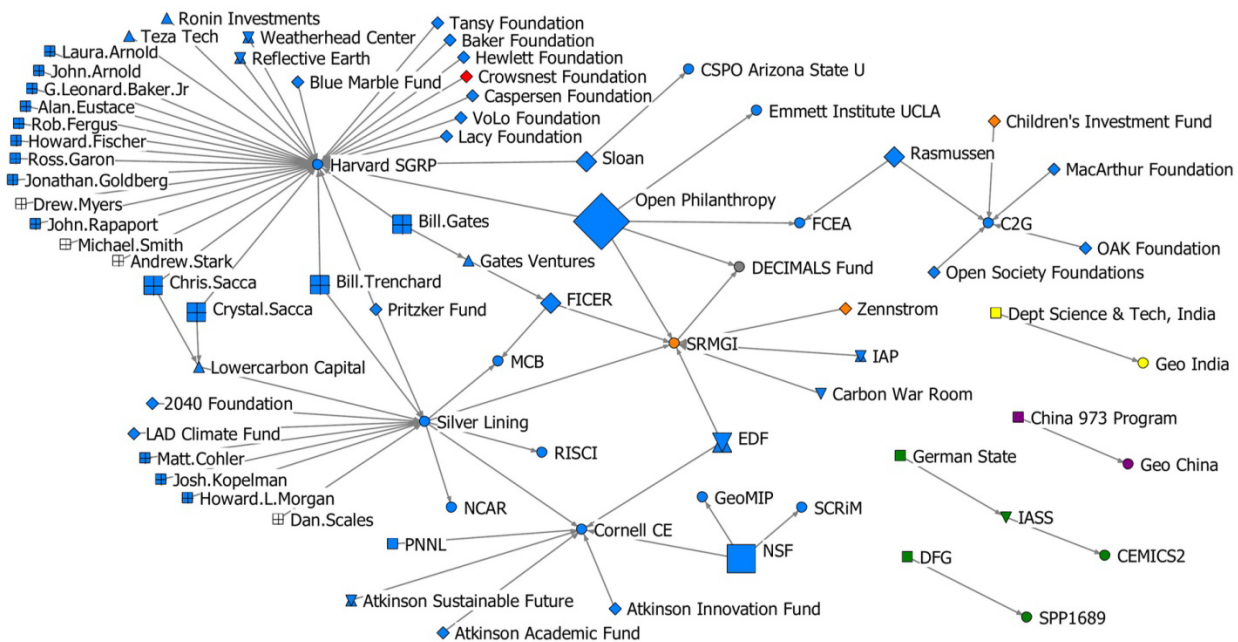
Necheles, Ella, Lizzie Burns, Amy Chang, and David Keith. ["Funding for Solar Geoengineering from 2008-2018."](#) Harvard's Solar Geoengineering Research Program (2018). • [DOWNLOAD PDF](#)

The Global Network of Solar Geoengineering Funding

Sources:

Necheles, Ella, Lizzie Burns, Amy Chang, and David Keith. **"Funding for Solar Geoengineering from 2008-2018."** Harvard's Solar Geoengineering Research Program (2018).

Surprise et al. **"Economic interests and ideologies behind solar geoengineering research in the United States."** Solar Geoengineering Non-Use Agreement (2022).



Color key: Blue = United States, Red = Canada, Orange = United Kingdom, Green = Germany, Yellow = India, Purple = China, White = undetermined.

Shapes key: Circle = solar geoengineering research project, Diamond = philanthropic foundation, Up triangle = private firm, Down triangle = think tank, Hourglass = NGO or university research center, Square = state, Box = individual.

Shape size: Number of projects funded.

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Iseman, Luke. "Make Sunsets." Initial Report on Weather Modification Activities, NOAA Form 17-4 (2023).

https://library.oarcloud.noaa.gov/noaa_documents.lib/OAR/OWAQ/Weather_Modification_Project/FY23/Q2/2023wmainitial.pdf

NOAA FORM 17-4 (4-81)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		Form Approved OMB Control No. 0648-0025 Expires 05/31/2021	
INITIAL REPORT ON WEATHER MODIFICATION ACTIVITIES This report is required by Public Law 92-205; 85 Stat. 735; 145 U.S.C. 330b. Knowing and willful violation of any rule adopted under the authority of Section 2 of Public Law 92-205 shall subject the person violating such rule to a fine of not more than \$10,000, upon conviction thereof.					
1. PROJECT OR ACTIVITY DESIGNATION, IF ANY Cooling Earth			2. DATES OF PROJECT a. DATE FIRST ACTUAL WEATHER MODIFICATION ACTIVITY IS TO BE UNDERTAKEN 2/12/2023 b. EXPECTED TERMINATION DATE OF WEATHER MODIFICATION ACTIVITIES 3/23/2223		
3. PURPOSE OF PROJECT OR ACTIVITY reduce average global temperature					
4. (a) SPONSOR NAME Make Sunsets Incorporated / Luke Iseman AFFILIATION Founder PHONE NUMBER 4156236817			4. (b) OPERATOR NAME Same as 4A AFFILIATION PHONE NUMBER		
STREET ADDRESS 514 Americas Way #18412 CITY Box Elder STATE SD ZIP CODE 57719			STREET ADDRESS CITY STATE ZIP CODE		
5. TARGET AND CONTROL AREAS (See Instructions) TARGET AREA all of Earth CONTROL AREA n/a					
LOCATION all of Earth		SIZE OF AREA 196,900,000 SQ. MI		LOCATION SIZE OF AREA SQ. MI	
6. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENTS AND THEIR DISPERSAL RATES, THE TECHNIQUES EMPLOYED, ETC. (See Instructions) We are deploying sulfur dioxide, calcium carbonate, and/or other proprietary compounds into the stratosphere to offset global warming. Our deployments will occur via balloons and/or other aircraft. Deployment rates will vary, peaking at no more than 100 megatons in total per year. Initial flights will occur with as little as 1mg per flight.					
7. LOG BOOKS Enter name, affiliation, address, and telephone number of responsible individual from whom log books or other records may be obtained. NAME Luke Iseman AFFILIATION founder PHONE NUMBER 4156236817 STREET ADDRESS 514 Americas Way #18412 CITY Box Elder STATE SD ZIP CODE 57719					
8. SAFETY AND ENVIRONMENT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Has an Environmental Impact Statement, Federal or State, been filed? If yes, please furnish a copy as applicable. <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Have provisions been made to acquire the latest forecasts, advisories, warnings, etc., of the National Weather Service, Forest Service, or others when issued prior to and during operations? If yes, please specify on a separate sheet. <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Have any safety procedures (operational constraints, provisions for suspension of operations, monitoring methods, etc.) and any environmental guidelines (related to the possible effects of the operations) been included in the operational plans? If yes, please furnish copies or a description of the specific procedures and guidelines.					
9. OPTIONAL REMARKS (See Instructions. Use Separate Sheet).					
CERTIFICATION: I certify that all statements in this report on this weather modification project are complete and correct to the best of my knowledge and are made in good faith.				NAME OF REPORTING PERSON Luke Iseman	
AFFILIATION founder, Make Sunsets				SIGNATURE Luke Iseman	
STREET ADDRESS 514 Americas Way #18412				OFFICIAL TITLE CEO	
CITY Box Elder		STATE SD		ZIP CODE 57719	
				DATE 3/31/2023	
				PHONE NUMBER 415 623 6817	