PETITION FOR RULEMAKING

TO AMEND THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION'S REPORTING REGULATIONS UNDER THE WEATHER MODIFICATION REPORTING ACT

BEFORE THE U.S. DEPARTMENT OF COMMERCE ON BEHALF

OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

March 12, 2024

Petition Filed With:

Gina Raimondo
Secretary of Commerce
U.S. Department of Commerce
1401 Constitution Ave., N.W.
Washington, DC 20230
TheSec@doc.gov

Richard W. Spinrad
Administrator, National Oceanic and Atmospheric Administration
1325 East-West Highway
Silver Spring, MD 20910
rick.spinrad@noaa.gov

Introduction

As climate change accelerates and its damages mount, the investigation and testing of some forms of climate intervention technologies - including solar radiation management (SRM) - appear imminent and inevitable. While some of these activities will likely take place with federal oversight and funding, the field overall lacks transparency and oversight. For example, some private actors have already begun to offer marketable "cooling credits" for solar radiation management (SRM) activities without prior reporting or review by the United States. Current federal law and regulations do not clearly and explicitly require reporting and governance for such activities.

Pursuant to the Administrative Procedure Act (APA), 5 U.S.C. § 553(d)-(e), the University of Houston Law Center's Environment, Energy & Natural Resources Law Center ("UH EENR Center"), the Institute for Responsible Carbon Removal, and individual law professors and environmental law practitioners respectfully petition the Secretary of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA), to initiate a rulemaking to amend the reporting requirements under NOAA's regulations implementing the Weather Modification Reporting Act of 1972, Pub. L. 94–490, §§1–6(a), Oct. 13, 1976, 90 Stat. 2359–2361 (codified as amended at 15 U.S.C. § 330) (the "Reporting Act"), concerning the injection of aerosols and other agents into the atmosphere to modify the climate.

This petition requests that NOAA amend its Reporting Act regulations to expand and clarify their application to such private SRM activities. Specifically, NOAA should (i) mandate reporting of expanded salient information needed to assess the potential impacts and risks of SRM activities; (ii) clarify reporting requirements for activities undertaken outside the United States that potentially affect areas or persons within the United States' jurisdiction, and (iii) clearly state NOAA's future programmatic strategy to learn about SRM, assess its impacts and risks, and identify a credible effective strategy to regulate future SRM activities.

When an agency receives a rulemaking petition, it must consider the petition and respond "within a reasonable time." 5 U.S.C. § 555(b). However, Executive Order 14008 requires "all

of" the federal government to take aggressive action to mitigate the harmful effects of climate change, reduce actions that contribute to accelerating climate effects, and assure environmental justice and social equity to communities affected by climate change. Exec. Order No. 14008, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Jan. 27, 2021). NOAA should therefore take immediate action to draft and implement these requested regulatory amendments.

Petitioners

The Environment, Energy & Natural Resources Center at the University of Houston Law Center links energy issues with impacts on environment and natural resources. Building on the cross-disciplinary expertise of its faculty in these areas and the complex and multi-faceted energy and environmental legal issues, the Center sponsors independent research and provides a forum for education and discussion of the most critical issues affecting the environment and energy governance, including climate change, air pollution, and renewable energy. The EENR Center routinely comments on emerging regulatory issues and seeks agency action through administrative petitions or other devices.

The Institute for Responsible Carbon Management (IRCM) is a research center associated with American University's School of International Service. Since 2018, IRCM has sought to evaluate the societal, legal, ethical, and political implications of carbon removal. Through its primary focus on exploring carbon removal technologies and practices, IRCM delves into the technical, social, and regulatory aspects of various carbon removal methods, including ocean-based approaches. IRCM's work prioritizes factors such as scalability, financial feasibility, and long-term effectiveness.

The individuals joining this petition (including directors of the Centers) are environmental law professors or environmental policy experts who have individually and separately studied the governance and legal challenges of potential research and testing of climate intervention technologies.

I. Background

As the effects of anthropogenic climate change continue to mount, interest has grown in climate intervention strategies that can directly prevent or offset climate disruptions. One type of climate intervention—SRM—relies on modifications to albedo to reflect solar radiation away from the Earth's surface. A particular SRM method, stratospheric aerosol injection, has drawn focus because it theoretically could reduce average global surface temperatures relatively quickly in a reversible fashion.

Stratospheric aerosol injection and other types of SRM (such as some kinds of marine cloud brightening) can take place from virtually any location and at relatively little direct cost compared to the economic burden of mitigating emissions and decarbonizing the global economy. Because of its relative technological ease and low cost, it is possible that a group of non-government actors, or even a single individual, could attempt SRM without the participation or consent of other nations or communities who could be affected by it. As a result, SRM in general, and stratospheric aerosol injection in particular, pose especially difficult governance

challenges, and current international legal regimes have struggled to establish a credible governance framework.

Domestically, the only federal law that explicitly regulates SRM is the Reporting Act.[1] NOAA's current regulations under the Reporting Act set out a broad and sweeping reporting system that explicitly covers many activities that would occur during SRM and stratospheric aerosol injection.[2] For example, 15 C.F.R. § 908.2 requires "any person engaging in any weather modification activity in the United States" to provide reports to NOAA. The regulations define "weather modification activity" as "[a]ny activity performed with the intention of producing artificial changes in the composition, behavior, or dynamics of the atmosphere." *Id.* at § 908.1(c).

NOAA has already clarified that actions conducted as weather modification activities would be subject to reporting, including "[m]odifying the solar radiation exchange of the earth or clouds, through the release of gases [sic], dusts, liquids, or aerosols into the atmosphere" as well as "other similar activities falling within the definition of weather modification set forth in § 908.1." *Id.* at §§ 908.3(a)(2), (b). While its regulations include an exemption for "activities of a purely local nature that can reasonably be expected not to modify the weather outside of the area of operation," NOAA has constrained this *de minimis* exemption solely to lightning deflection, the use of small heat sources to limit frost damage, and religious activities intended to modify the weather. *Id.* at § 908.3(c). Notably, this exemption does *not* include small-scale SRM activities conducted for research or commercial purposes.

While NOAA's regulations explicitly include solar radiation modification as reportable under the Reporting Act, its database of prior reports of weather modification do not include any disclosures of self-identified SRM projects or activities. And NOAA has not expressly addressed how its regulations under the Reporting Act will apply to SRM activities intended to modify climate or other climate intervention activities. The absence of disclosures in NOAA's database suggests that the current regulations must be more explicit, and section 908.3(a) should expressly include solar radiation management activities (*e.g.,* adding to § 908.3(a) "including solar radiation management and any activities intended to modify climate").

II. Actions Requested

Despite their sweep, NOAA's implementing regulations for the Reporting Act have several important gaps that NOAA must address. In particular, these gaps include (i) a failure to include salient information needed to assess the potential impacts and risks of SRM activities, (ii) a lack of clear reporting requirements for activities undertaken outside the United States that potentially affect areas or persons within the United States' jurisdiction, and (iii) a clear statement of NOAA's future programmatic strategy to learn about SRM, assess its impacts and risks, and

[1] While Congress has addressed solar radiation management in appropriations legislation, *see e.g.,* Division B of the Consolidated Appropriations Act of 2022, those legislative directions have focused on reports to Congress or funding for research. It has not used funding legislation to set out substantive standards for SRM projects or activities.

[2] NOAA should also consider updating its notification requirements to allow electronic disclosures rather than reporting via letters or paper submissions.

identify a credible effective strategy to regulate future SRM activities. When NOAA requires reports of SRM actions that constitute weather modification under the Reporting Act, it should mandate submission of additional data that would clarify the unique risks and impacts of this evolving field of research and activity. This information should include the following categories of data:

A. Require Reporting of a Broader Scope of Information.

We request that NOAA review the adequacy of its reporting regulations for SRM and other activities in the broader field of climate intervention. NOAA's original rules, promulgated under its implementing regulations, published more than 50 years ago (37 Fed. Reg. 22974 (Oct. 27, 1972)), mandate minimal reporting of core information about activities related to weather modification. Climate intervention may seek effects on a much larger scale with serious consequences lasting far longer than local weather modification.

As part of its regulatory burden review under the Paperwork Reduction Act of 1995 ("PRA"), NOAA invited public comment on the sufficiency of its reporting rules and of the information it currently gathers. NOAA explicitly sought public comment on, *inter alia*, "ways to enhance the quality, utility, and clarity of the information to be collected." 85 Fed. Red. 83523 (Dec. 22, 2020). Despite this opportunity to assess the adequacy and efficacy of its rules, NOAA decided not to change any of its reporting requirements in its final PRA submission to the Office of Management and Budget. *See* Off. of Mgmnt. & Budget, NOAA, No. 0648–0025, Weather Modification Activities Reports (2021). NOAA should revisit that decision and require reporting of additional information for SRM that includes, at a minimum:

1. ***Reporting of small-scale experiments***. We note that the Weather Modification Reporting Act defines "weather modification" as "any activity performed with the intention of producing artificial changes in the composition, behavior, or dynamics of the atmosphere." Pub. L. 94–490, §§1–6(a), Oct. 13, 1976, 90 Stat. 2359–2361 (codified as amended at 15 U.S.C. § 330). While this definition arguably excludes non-perturbative small-scale experiments designed to produce and observe the behavior of chemicals in the atmosphere without producing discernible effects on weather, NOAA should broadly interpret its statutory authority to mandate reports on any outdoor experimentation in connection with potential solar radiation management, even if the experiments themselves do not affect the weather. If NOAA concludes that it lacks sufficient statutory authority for this mandate, Congress may need to consider future action to modify the NWMA accordingly.

2. ***Information regarding the target area***. This information would include ownership of the area targeted by the climate intervention action and owners of properties adjoining the target area who may also incur impacts from the project. While some SRM actions may aim for climate impacts on a wide scale, this information obligation would center on the areas immediately under or adjacent to the launch and release sites. NOAA could also consider alternative forms of notification such as electronic notification, email, or social media.

3. ***Projected climate and other environmental effects***. These questions would target unique aspects of particular climate intervention technologies that lie outside the data sought by NOAA's existing reporting forms. For example, solar radiation management projects that use injection of stratospheric aerosols should report (i) the solar energy that the project will screen expressed in both W/m2 and total energy for the target area; (ii) the amount of time required for the aerosol to completely disperse to non-detectable levels; (iii) any environmental effects of the airborne particles (aside from solar irradiation reductions); (iv) expected times and patterns of precipitation of the aerosols, if any; (v) any insurance carried by the project for damage potentially caused by it; and (vi) whether the project will seek to obtain a financial benefit or commercial compensation for its purported effects on solar insolation or climate impacts. (And if yes, NOAA should require additional disclosure of information about those benefits or other financial support.) These disclosures of significant impacts would also alert NOAA to any need for additional environmental review (e.g., if the project involves federal action, the need for an environmental assessment under the National Environmental Policy Act).

4. ***Other notifications and authorities***. NOAA should require reporting of the project applicants' notifications to other affected persons, including: the public, other federal or foreign governmental entities, or other regulatory bodies (including state environmental agencies). This report should include whether the data generated by the project will become available to the public. It should also disclose whether the project will receive financial support or funding from a foreign national, corporation, or government.

Requiring submission of this broader set of data for SRM activities would fall comfortably within the scope of NOAA's authority to request information on "similar activities" to the weather modification actions explicitly named in its regulations. 15 C.F.R. § 908.3(b). It also would work effectively in tandem with NOAA's regulatory authority to provide supplemental notices when a report identifies an activity that "may significantly depart from the practices or procedures generally employed in similar circumstances to avoid danger to persons, property, or the environment, or indicates that success of Federal research projects may be adversely affected…." *Id.* at § 908.12(d). Finally, we request that NOAA continue to make all reports and information that it receives under the revised regulations available to the public in a readily accessible and transparent way. (For example, by placing it on the current publicly available NWMA report database on NOAA's website.) NOAA's regulations should require the posting of these data on its website in an efficient and timely manner.

B. Applying the Reporting Act to Other Persons and Places Subject to U.S. Jurisdiction.

Three scenarios of concern create a significant danger that private parties may attempt SRM activities while evading the Reporting Act's broad reporting system. These three scenarios include, but are not limited to:

- Actions undertaken in areas subject to U.S. jurisdiction but outside of the United States (as currently defined in the Reporting Act regulations).

- Actions undertaken outside of the United States by a U.S. citizen or other persons otherwise subject to U.S. jurisdiction.

- Actions undertaken outside of the United States that may reasonably cause effects within the United States.

We request that NOAA amend its reporting requirements to apply them beyond the regulation's current geographic scope. This information will help prevent aggressive expansions of climate intervention activities that might otherwise occur without regulatory oversight, especially as U.S. citizens engage in private climate modification efforts for profit both outside and within the United States.

1. ***Actions undertaken in areas subject to U.S. jurisdiction but outside of the "United States" (as currently defined in the Reporting Act regulations).***

Filling in the regulatory gaps that fail to expressly cover SRM activities in the Exclusive Economic Zone or aboard U.S.-flagged vessels should be a straight-forward and uncomplicated task. While NOAA defines the United States as "[t]he several States, the District of Columbia, the Commonwealth of Puerto Rico, and any territory or insular possession of the United States" (15 CFR § 908.1(d)), the Reporting Act provides that "[t]he term 'United States' ***includes*** the several States, the District of Columbia, the Commonwealth of Puerto Rico, and any territory or insular possession of the United States." Pub. L. 94–490, §§1–6(a), Oct. 13, 1976, 90 Stat. 2359–2361 (codified as amended at 15 U.S.C. § 330) (emphasis added).

As the Supreme Court has repeatedly held, "includes" is an open-ended term, especially when—as with the Reporting Act—Congress' definition of "United States" here uses "includes" while every other definition in the statute uses the word "means." *See Christopher v. SmithKline Beecham Corp.,* 567 U.S. 142, 162 (2012) (*"*the definition is introduced with the verb 'includes' instead of 'means.' This word choice is significant because it makes clear that the examples enumerated in the text are intended to be illustrative, not exhaustive"); *Burgess v. United States, 553 U.S. 124, 131, n.3 (2008)* ("[a] term whose statutory definition declares what it 'includes' is more susceptible to extension of meaning...than where...the definition declares what a term 'means'") (alteration in original) (some internal quotation marks omitted); *Groman v. Comm'r,* 302 U.S. 82, 86 (1937) ("when an exclusive definition is intended the word 'means' is employed, as in the section we have quoted defining reorganization. . . whereas here the word used is 'includes.'").

(i) <u>The U.S. Exclusive Economic Zone</u>. The U.S. claims a 200-mile Exclusive Economic Zone (EEZ), over which it claims certain rights, including:

> to the extent permitted by international law, (a) sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, both living and nonliving, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy

from the water, currents and winds.

Proclamation No. 5030, 48 Fed. Reg. 10605 (Mar. 10, 1983). Since reporting of SRM activities within the EEZ is done for the purpose of "conserving and managing natural resources" in the EEZ, there is no barrier to NOAA extending the requirements of the Reporting Act to that area. It should be noted that NOAA already extensively regulates activity in the EEZ under other statutory authorities. *See, e.g.*, 50 C.F.R. § 622, Subpart S (Fisheries Management Plan for the Exclusive Economic Zone off Puerto Rico); 50 C.F.R. § 679 (Fisheries of the Exclusive Economic Zone off Alaska); 50 C.F.R. § 680 (Shellfish Fisheries of the Exclusive Economic Zone off Alaska).

(ii) U.S.-flagged vessels. Jurisdiction over ships on the high seas is determined by the law of the flag doctrine, which states that "a merchant ship is part of the territory of the country whose flag she flies, and that actions aboard that ship are subject to the laws of the flag state." *United States v. Jho*, 534 F.3d 398, 405–06 (5th Cir. 2008) (relying on *Cunard S.S. v. Mellon*, 262 U.S. 100, 123 (1923)); *Lauritzen v. Larsen*, 345 U.S. 571, 585 (1953); *see also* Restatement (Third) of the Foreign Relations Law of the U.S. § 502 (Am. Law. Inst. 1987) ("The flag state may exercise jurisdiction to prescribe, to adjudicate, and to enforce, with respect to the ship or any conduct that takes place on the ship.").

Notably, EPA has invoked this basis for exercising jurisdiction over a U.S.-flagged vessel to intervene in a proposed climate intervention project that involved releasing iron oxide compounds into the high seas from a U.S.-flagged vessel.[3] More generally, the United States can assert jurisdiction over a vessel if the vessel has registered with the United States and flies its flag. If a vessel under a U.S. flag attempts to undertake activities that trigger disclosure obligations under the Reporting Act, NOAA would have the jurisdictional authority to compel compliance.

2. Actions outside the United States by persons otherwise subject to U.S. jurisdiction.

The United States (and federal agencies carrying out its laws) indisputably have the jurisdictional power to regulate the conduct by U.S. citizens outside of U.S. territory. This power rests in the nation's sovereign authority to govern the conduct of its nationals. *The Apollon*, 22 U.S. (9 Wheat.) 362, 370 (1824); *see Reid v. Covert*, 354 U.S. 1, 59–64 (1957) (Frankfurter, J., concurring) (discussing the history of extraterritorial jurisdiction).

Congress must exercise this authority through clear legislative language if it wishes its statutes to apply extraterritorially. *Kiobel v. Royal Dutch Petroleum Co.,* 569 U.S. 108 (2013); *Abitron Austria v. Hetronic Int'l*, 600 U.S. 412, 417–18, 422 (2023) (establishing a two-part test for agency enforcement of extraterritorial actions); *EEOC v. Arabian Am. Oil Co*., 499 U.S. 244, 248 (1991).

[3] Randall S. Abate & Andrew B. Greenlee, *Sowing Seeds Uncertain: Ocean Iron Fertilization, Climate Change, and the International Environmental Law Framework*, 27 PACE ENV'T. L. REV. 555, 558 (2010).

When Congress chooses to exercise this power, it gives the United States authority over the conduct of those subject to its jurisdiction even when effects of their actions occur outside the United States. In fact, NOAA exercises extraterritorial authority under multiple existing statutes. *See, e.g.*, NOAA, *Jurisdiction Over Vessels*, (Oct. 2022) https://www.noaa.gov/jurisdiction-over-vessels; *see also Ga. Aquarium, Inc. v. Pritzker*, 135 F.Supp.3d 1280 (N.D. Ga. 2015) (holding the Marine Mammal Protection Act has extraterritorial authority even when substantial effects of action are felt outside the United States). Beyond explicit statements, federal courts can also rely on statutory context to discern Congressional intent for a statute to have extraterritorial effect. *Morrison v. Nat'l Austl. Bank Ltd.*, 561 U.S. 247, 264–265 (2010); *see, e.g.,* 16 U.S.C. § 1538(a)(1) (section 9 of the Endangered Species Act applies to "any person subject to the jurisdiction of the United States.")

The Reporting Act clearly manifests Congress' intent to authorize NOAA to require reporting of weather modification activities that occur outside the United States. While the Act does not directly address the extraterritorial application of its reporting obligations, the National Weather Modification Policy Act's statutory statement of policy explicitly refers to Congress' concerns over the international impacts of weather modification activities that could cause harm or conflict. Pub. L. 94-490, §§1–6(a), Oct. 13, 1976, 90 Stat. 2359–2361(codified as amended at 15 U.S.C. § 330) ("Weather modification programs may have long-range and unexpected effects on existing climatic patterns *which are not confined by national boundaries*…to develop both national *and international* mechanisms designed to minimize conflicts which may arise with respect to the peaceful uses of weather modification…[and]to integrate the results of existing experience and studies in weather modification activities into model codes and agreements for regulation of domestic *and international* weather modification activities") (emphasis added).

The NWMA also directed NOAA to report on the need for, and scope of, international agreements for the peaceful use of weather modification. Congress asked that NOAA's report include "recommendations for any regulatory and other legislation which may be required to implement such policy and program or for any international agreement which may be appropriate concerning the peaceful uses of weather modification, including recommendations concerning the dissemination, refinement, and possible implementation of the model domestic code and international agreement developed under the specifications of section 4." *Id.* Notably, when Congress directed the agency to assess and report on the international implications of weather modification activities, it did not limit the scope of the Reporting Act's definition of "weather modification" to actions undertaken solely within the United States. *Id.* (defining "weather modification" as "any activity performed with the intention and expectation of producing changes in precipitation, wind, fog, lightning, and other atmospheric phenomena.").[4]

3. Actions undertaken outside of the United States that may reasonably cause effects within the United States.

NOAA should expand its reporting requirements to include any weather modification activity, including SRM, undertaken anywhere in the world by any person or government, which

[4] OSTP explicitly noted the potential international impacts and concerns from SRM activities in its report to Congress. *See* OSTP Report at 43–44 (role of USGCRP in coordinating federal research into SRM "whether performed domestically or internationally").

foreseeably or intentionally seeks to cause effects within the United States. This concern is not theoretical. Make Sunsets, a small start-up company located in California, previously launched at least two weather balloons from Mexico (Baja California) and three from Nevada into the atmosphere to release small amounts of sulfur dioxide that would create reflective sulfate particulates.[5] The company has already sought to sell any temperature reductions caused by its releases in private carbon markets as the equivalent of carbon sequestration credits.[6] Make Sunset's actions sparked enormous controversy, including provoking an announcement by the federal Government of Mexico that it will prohibit any future launches of such balloons or other stratospheric climate interventions. While Make Sunsets has suspended further launches and apparently has removed its web page offering "cooling credits," the risk of similar future action remains.

Notably, one launch site used by Make Sunsets is located in Baja California, Mexico, which is immediately south of the U.S.-Mexican border. Beyond the impacts of releases on areas within U.S. jurisdiction, the lack of navigational controls or data relays on the balloons used by Make Sunsets also make it possible, if not likely, that the high-altitude balloons might reach the United States.

Private efforts to modify climate have already expanded beyond SRM activities. At least two other companies (Blue Dot Change and AMR AG) have announced plans to release ferric chloride into the atmosphere to scavenge ambient methane,[7] and also intend to monetize any resulting GHG reductions. According to a recent report in *MIT Technology Review*, several small commercial ventures intend to field test in the next two years the effectiveness of releasing small amounts of ferric chloride over marine waters to destroy ambient methane.[8] The companies hope to spray the particles at commercial scales to either generate tradable emission credits or agreements with corporations "willing to pay for forms of 'climate repair.'" These activities also fall squarely under the definition of "weather modification activity" because they seek to "modify[] the solar radiation exchange of the earth or clouds through the release of gases…"—here, ferric chloride in the combustion contrails of ships—into the atmosphere. 15 C.F.R. § 908.1(c).

Agencies may regulate non-U.S. citizens who take actions that result in effects within the United States. *Morrison*, 561 U.S. at 282 (Stevens, J., concurring) (citing *Env't Def. Fund, Inc. v. Massey*, 986 F.2d 528, 531–32 (D.C. Cir. 1993)) ("the presumption against extraterritoriality … has lesser force when the failure to extend the scope of the statute to a foreign setting will result in adverse effects within the United States.") (internal quotations omitted); *Laker Airways Ltd. v.*

[5] https://makesunsets.com/blogs/news/3-launches.

[6] *Id*.

[7] Though not a form of solar radiation management, releasing ferric chloride to scavenge ambient methane is a "weather modification activity" that is subject to the Reporting Act's requirements. 15 C.F.R. § 908.1(c).

[8] James Temple, *These Startups Hope to Spray Iron Particles Above the Ocean to Fight Climate Change*, MIT TECHNOLOGY REVIEW (Mar. 2023), https://www.technologyreview.com/2023/02/15/1068495/these-startups-hope-to-spray-iron-particles-above-the-ocean-to-fight-climate-change/.

Sabena, 731 F.2d 909, 921–22 (D.C. Cir. 1984) ("conduct outside the territorial boundary which has or is intended to have a substantial effect within [the United States] may also be regulated").

Furthermore, courts have held that a foreign corporation that knowingly sends pollutants into the United States can be held liable under CERCLA when "aiming its waste" at the state knowingly and on a daily basis for over a decade. *Pakootas v. Teck Cominco Metals, Ltd.*, 905 F.3d 565, 577–78 (9th Cir. 2018) ("there would be no fair play and no substantial justice if [the foreign corporation] could avoid suit in the place where it deliberately sent its toxic waste" and the standard is that "express aiming…mean[s] something more than a foreign act with foreseeable effects in the forum state."); *Ex parte Aladdin Mfg.*, 305 So. 3d 214, 223 (Ala. 2019) ("the actions of an entity that result in harmful substances being placed into…a foreign jurisdiction [is then] reasonable [for that entity] to be hauled into court in that foreign jurisdiction.").

C. Prepare a Regulatory Strategy for SRM and Climate Intervention Activities.

Beyond a focused reassessment of the sufficiency of its current rules under the Reporting Act, we request that NOAA undertake a broader policy and rulemaking process to develop a comprehensive strategy that would govern private SRM research subject to its jurisdiction. This strategy should include coordination with other federal agencies having concurrent jurisdiction (such as the Federal Aviation Agency, the U.S. Environmental Protection Agency, the Department of Interior, and the National Science Foundation) as well as other key stakeholders.

NOAA's comprehensive research governance strategy should reflect the conclusions and recommendations of the White House's recent solar radiation management research governance report, which was prepared in response to Congressional mandate in the Consolidated Appropriations Act of 2022. *See* Office of Science and Technology Policy, *Congressional Mandated Research Plan and An Initial Research Governance Framework Related To Solar Radiation Modification* (2023) ("OSTP Report").[9] While this report briefly noted that "further development and evolution of related policies" may be pursued as appropriate, it highlighted the need to create governance around public perturbative activities. *Id.*

While sharpening the scope and content of the Reporting Act's application to SRM is a critical first step, NOAA should begin a larger and more important effort: to undertake a broader policy and rulemaking process to develop a comprehensive regulatory strategy for governing private SRM activities subject to the Reporting Act's jurisdiction. This strategy should include coordination with other federal agencies having concurrent jurisdiction to assure integrated and coherent regulatory requirements for future SRM actions. At the least, NOAA should seek to include the Federal Aviation Administration, the U.S. Environmental Protection Agency, the U.S. Department of Interior, and other agencies as necessary (e.g., the State Department). This policy and rulemaking initiative should take place with full public transparency and stakeholder

[9] The OSTP report is available at https://www.whitehouse.gov/wp-content/uploads/2023/06/Congressionally-Mandated-Report-on-Solar-Radiation-Modification.pdf.

participation preferably via full notice-and-comment rulemaking under the Administrative Procedure Act.[10]

IV. Conclusion

Because private commercial attempts at climate modification through solar radiation management have already begun, NOAA should update the breadth and scope of its regulations under the Reporting Act to encompass climate intervention activities that fall within the definition of "weather modification." In particular, this regulatory clarification should explicitly address reporting of SRM activities. This requested rulemaking would help the federal government prevent harm and track activities until or unless Congress chooses to take legislative action or all or any appropriate federal agencies undertake full notice-and-comment rulemaking. This rulemaking would not halt or suspend efforts to research and understand potential climate intervention strategies, including SRM. But it will help assure that the federal government has the data it needs to understand activities in the private sector and assure that it can respond quickly and effectively to any unexpected risks or impacts.

Respectfully submitted,

Professor Tracy Hester
Co-Director, Environment, Energy, and Natural Resource Center
University of Houston Law Center
4170 Martin Luther King Boulevard
Houston, TX 77024
tdheste2@cougarnet.uh.edu

David Bookbinder
Law Offices of David Bookbinder
107 S. West Street, Suite 491
Alexandria, VA 22314

[10] While OSTP concluded that the U.S. Global Change Research Program should coordinate SRM activities, that recommendation dealt solely with large-scale, multi-agency research efforts undertaken by Federal agencies. *Id.* at 43.

Albert C. Lin
Martin Luther King Jr. Professor of Law
2109 King Hall
University of California-Davis School of Law
One Shields Avenue
Davis, CA 95616
aclin@ucdavis.edu

Wil Burns
Co-Director, Institute for Responsible Carbon Removal,
American University
&
Visiting Professor
Environmental Policy & Culture Program
Northwestern University
wburns@american.edu

Simon Nicholson
Associate Professor
Environment, Development & Health
American University
Washington, DC 20016
simon.nicholson@american.edu

Shuchi Talati, Ph.D.
The Alliance for Just Deliberation on Solar Geoengineering
Washington, DC 20017
stalati@sgdeliberation.org

APPENDIX
Proposed Revisions to Regulatory Reporting Requirements
SRM & Climate Modification Activities

Purpose	Section	Previous Language	Proposed Revised Regulatory Language[11]
Expanding reporting requirements to clearly request information on SRM and other climate modification activities.	15 CFR § 908.3(a)(1)	"Seeding or dispersing of any substance into clouds or fog, to alter drop size distribution, produce ice crystals or coagulation of droplets, alter the development of hail or lightning, or influence in any way the natural development cycle of clouds or their environment;"	"Seeding or dispersing of any substance into clouds or fog, to alter drop size distribution, produce ice crystals or coagulation of droplets, alter the development of hail or lightning, or influence in any way the natural development cycle of clouds or their environment, **including solar radiation management and any other activities intended to modify climate, undertaken by any person or government, which may foreseeably or intentionally seek to cause effects within the United States**;"
Detailing requirements for reporting disclosures, adjusted to reflect concerns specific to SRM activities.	15 CFR § 908.4(a)(5)	"A map showing the approximate size and location of the target and control areas, and the location of each item of ground-based weather modification apparatus, precipita- tion measuring device, and, for airborne operations, the airport;"	"A map showing the approximate size and location of the target and control areas, and the location of each item of ground-based weather modification apparatus, precipitation measuring device, and, for airborne operations, the airport, **including information of ownership of the area targeted by climate intervention and owners of properties adjoining the target area;**"

[11] Proposed language formatted in bold.

Purpose	Section	Previous Language	Proposed Revised Regulatory Language[11]
Addition of a new section under these reporting requirements, with questions specifically targeting SRM and climate modification activities.	Insert new subsection into 15 CFR § 908.4(a)	This section would fit best following 15 CFR § 908.4(a)(8) and before 15 CFR § 908.4(a)(9)	**"Solar radiation management projects that use injection of stratospheric aerosols must report (i) the solar energy that the project will screen, expressed in both W/m2 and total energy, for the target area; (ii) the amount of time required for the aerosol to completely disperse to non-detectable levels; (iii) any environmental effects of the airborne particles (aside from solar irradiation reductions); (iv) expected times and patterns of precipitation of the aerosols; (v) any insurance carried by the project for damage potentially caused by it; (vi) whether the data generated by the project will become available to the public; and (vii) whether the project will seek to obtain a financial benefit or commercial compensation for its purported effects on solar insolation or climate impacts. If yes, additional disclosure of information about these benefits or other financial support may be requested. Additional reporting notifications to other affected persons may be required, including: the public, other federal or foreign government entities, state environmental agencies, or other regulatory bodies."**