Forum

Who Are the Engineers? Solar Geoengineering Research and Justice

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Abstract

Solar geoengineering research is a small but growing field as concerns arise that reducing emissions will not be sufficient to limit severe climate impacts. With this increasing attention, ensuring that the field advances equitably and inclusively is of immense importance. This commentary is a response to arguments that advocate for abandoning solar geoengineering research altogether because it perpetuates colonialism and promotes injustice. We find, however, that this brand of argument is itself performatively colonial and recommend a more inclusive framework for solar geoengineering governance that integrates existing research on relevant structures.

There has been increased attention on solar geoengineering (SG) research as climate impacts are worsening and mitigation efforts are seeing limited success. This growing attention is evident from a recent doubling of congressional appropriations for solar geoengineering research as well as the recent National Academies report on SG research and governance (National Academies of Sciences, Engineering, and Medicine [NASEM] 2021; Talati 2020). This technology, research surrounding it, and its growing prevalence have been extremely controversial. Numerous NGOs, environmental advocacy groups, and academics have expressed alarm and condemnation of both research into and hypothetical deployment of such technologies (Center for International Environmental Law [CIEL] 2019; ETC Group 2018; Stephens and Surprise 2019; Heinrich Boll Foundation 2017; Schneider and Fuhr 2021; York 2021).

When referring to SG, we focus on the methods that are highlighted by the 2021 National Academy of Sciences report on this topic: stratospheric aerosol injection, marine cloud brightening, and cirrus cloud thinning (NASEM 2021).

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SG could potentially limit harm from climate change impacts and for relatively low cost. However, concerns are wide ranging and include "moral hazard" risks of reducing resources and motivation for emissions mitigation, the "slippery slope" risk that early-stage research would inevitably lead to deployment, and environmental risks around potential changes in precipitation patterns and extreme events—especially as impacts may be heterogeneous across regions. SG additionally does not address the root cause of climate change.

One particular aspect of controversy concerns the geopolitical implications of SG. Larger and richer countries, along with people from more socially advantaged demographics, have so far played an outsized role in the development of SG, as they have in climate policy more generally. Some worry that SG research and deployment would be corrupted by this fact—that SG will inevitably create new political inequalities or exacerbate existing ones, especially between the Global North and the Global South.

Ironically, such arguments often participate in the very dynamics they criticize. Stephens and Surprise (2019), for instance, argue that we should reject geoengineering as an approach being championed "by a small group of primarily white men at elite institutions in the Global North." These Global North–based researchers, without any disclosed consultation with Global South organizations or researchers, pronounced the Global South's interests from a microphone based in the North. They thus introduce a standard their own published argument fails to meet, and one that is also largely not met by organizations advocating *against* geoengineering research (CIEL 2019). We have also observed that often, if Global South organizations are quoted or consulted, the same few groups are consistently used by authors and organizations that advocate against research on this topic.

We argue for a better approach to the politics of SG: one sensitive to the very real concerns of injustice and inequality raised by justice-minded organizations, but one that decides less from the armchair about what could be beneficial for global justice and declares less on other people's behalf. What remains to those of us who strive for justice depends on the outcome of the political contest on specific political questions: if the technologies are advanced, how it would occur, by whom, and what political structures and institutions they will meet when they are born. The point of research about SG should be to make these questions answerable, which may prove that a societally beneficial SG deployment program is not feasible and thus contribute materially to preventing such deployment.

Rather than abandoning all research in this field due to problematic structures that may currently exist in some institutions and regions, we argue that more constructive work must be done to build a platform that enables inclusive research and governance. We assert that we should advocate for and produce a public, non-military alternative research program that helps fund and build capacity of Global South researchers and policy makers. Such a program should produce a collective framework to make collective decisions about SG—importantly, including the decision about whether to abandon such technologies and further research into them. A ban at this stage of low information and low involvement of Global South

researchers and policy makers—especially if done at the behest of Global North researchers and organizations—is premature and undemocratic.

The Landscape

There are currently no national or international governance frameworks for SG research, and there is no question that future decisions should be made in an inclusive, deliberative manner. The inclusion of Global South and underrepresented voices is vital to producing diverse ideas and building the legitimacy of SG research (Rahman et al. 2018; Winickoff et al. 2015).

Early efforts focused on building capacity within vulnerable communities, enabling public participation, and ensuring just decisions are under way. Many advocates suggest that efforts for inclusive engagement that originate in or are funded by the North are inevitably inauthentic vehicles to obtain consent for their values. However, some civil society organizations are focused on efforts specifically to help communities new to geoengineering form their own opinions. Examples include the Solar Radiation Management Governance Initiative (SRMGI), which supports capacity-building enterprises in vulnerable communities through its DECIMALS program, and the Carnegie Climate Governance Initiative, which held or participated in deliberative workshops on a range of geoengineering technologies in the Global South (Carnegie Climate Governance Initiative 2018; SRMGI 2020). The Union of Concerned Scientists is also focused on mechanisms to ensure that diverse voices are part of decision-making processes for research (Talati and Frumhoff 2020). There are additional ongoing efforts to govern the first small-scale SG experiment, SCoPEx, through an independent advisory committee, including creating meaningful public participation processes (SCoPEx Independent Advisory Committee 2021). Legitimate critiques of such examples exist (Aganaba-Jeanty 2019), but to address concerns with inequality, efforts to incorporate public participation into decision-making should expand, not contract.

There are, of course, limitations to these initiatives, and we are early yet in building global capacity for participation in both SG research and governance (McLaren and Corry, 2021). Importantly, the United States has begun appropriating funds for SG research without a federal governance framework (Talati 2020). While funds remain minimal, this is a clear and dangerous gap that must be addressed.

However, any argument declaring that there is no pathway toward inclusive governance is similarly premature. SG research still remains extremely nascent: outdoor experimentation is only just beginning to draw increased attention, requiring the development of a more robust framework for research governance.

Global North domination of SG is not inevitable, and arguments that portray Northern dominance as inevitable can, paradoxically, help create the political reality that they warn us about. Justice-minded researchers abandoning SG research would only serve to ensure a monopoly on said research by indifferent and well-financed political actors. By Stephens and Surprise's (2019) own admission, the capabilities and incentives to develop the ability to control climate outcomes are concentrated in

the hands of militaries, billionaires, and potentially autocratic states—the institutions and people least likely to be constrained by the negative public perceptions that justice-oriented arguments might mobilize.

The basic know-how to deploy SG technology already exists: stopping research at this point only prevents us from gaining the additional knowledge necessary to evaluate the possible effects of SG deployment across regions. That might well increase the probability of unilateral and dangerous SG deployment as climate crisis impacts intensify and decision makers get increasingly desperate (Osaka 2021). The balance of evidence from sociology and public choice theory suggests that widespread and multilateral research builds prosocial norms and reduces bias relative to the state of affairs in which research output on a subject is confined to a small number of well-positioned actors (Winsberg 2021).

Moreover, Global South researchers and decision makers themselves might well have different perspectives on all these issues—a set of perspectives that many of those against research have not engaged with or included as co-creators in their work. Early engagement efforts with Global South environmental leaders on this topic has illustrated the diversity and richness of views on SG research and governance across the community (Winickoff et al. 2015). A recent workshop to build knowledge in Southeast Asia led by Global South researchers found that participants supported regional research efforts for geoengineering and increased international collaboration (Delina 2020).

But we also need to know what will happen to marginalized communities, directly addressing concerns that SG will buttress a "colonial capitalism" (Stephens and Surprise 2019). For anticolonial theorists like Amilcar Cabral (1974), colonialism involves a concrete form of political control—over how a society is able to meet its material needs over time. This definition allows us to say in specific terms what the colonial dangers of climate crisis itself are: that its ecological and political consequences will erode the ability of communities to confidently meet their key needs for food, water, and shelter (Martinez 2014; Táíwò 2019). It also gives us a way to evaluate the implications of SG for colonial injustice: we should judge prospective research programs, deployments, and nondeployments of solar geoengineering by whether or not they expand or contract vulnerable communities' control over their basic needs.

These are complex questions, but they raise important issues about how the ecological, social, and political systems will behave under different conditions, with or without SG. Such questions cannot be answered by way of moralism about the political impurity of scientific processes or by speculation about political ones. Anticolonial politics should demand answers to these questions, not foreclose the possibility of getting them.

Next Steps

More must be done to enable legitimate participation from geographically and diverse publics in all aspects of SG and to make the study of how to do so an

integral part of SG research and climate research generally. These voices are key not only to justice but to creating valuable knowledge and research. The Global Citizens' Assembly to be convened ahead of COP26 is a step in the right direction, enlisting people chosen by lottery from the world over to participate in intensive climate discussion (Reuters 2020). This approach fits with other political experiments in direct democracy like participatory budgeting, lottocracy, and government by sortition—all of which have been lauded for increasing equity as well as increasing community members' understanding of both the issues themselves and the process of government (Guerrero 2014; Su 2017; Wampler and Hartz-Karp 2012). Policy makers have tended to consign such efforts to merely advisory roles, but empowering these bodies with direct and consequential decision-making power is key to their potential to address social inequalities as such.

Building such an inclusive research enterprise with widespread, politically consequential participation is an uphill task at that. But it is presumptuous and self-contradictory to categorically declare that either inclusive research or governance of SG is impossible, and doubly so to have declared this unilaterally, without the input of the vulnerable communities who are supposedly served by this genre of argument. Limiting the future of research to the dynamics that currently exist is a narrow, counterproductive way to look at the injustices that exist in any of our institutions. As voices in the Global North, we should promote alternatives that aim to correct, or at least ameliorate, unjust North–South power dynamics.

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