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Editorial: Solar geoengineering in the horizon: humanitarian dimensions

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Editorial on the Research Topic

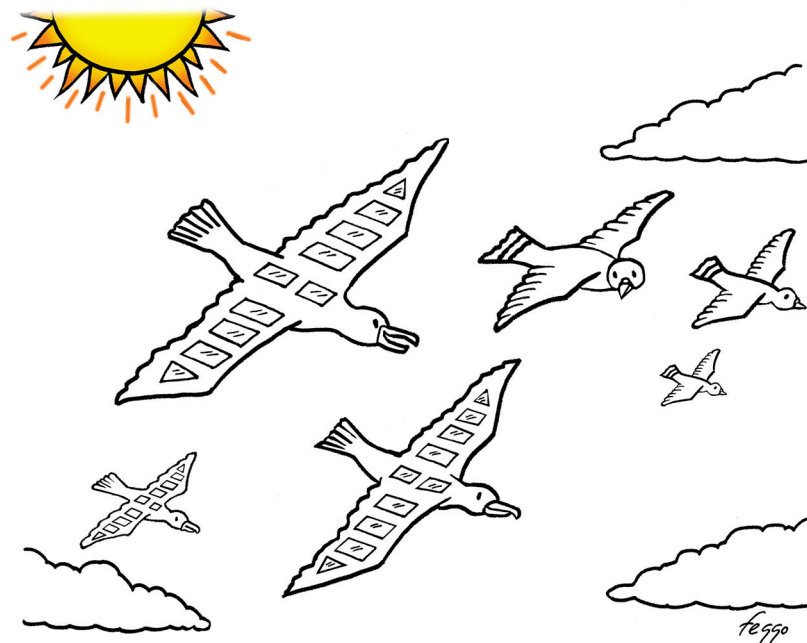
Solar geoengineering in the horizon: humanitarian dimensions

Should humanitarians, with hearts so pure,
Turn to solar geoengineering, a remedy unsure?
A risky path, a choice profound,
As nature's forces loom around.
A moral dilemma, fraught with strife,
In a world beset by climate's knife.

-ChatGPT, 2023

Climate change is already making humanitarian work harder, less predictable, and more complex (IFRC., 2018; Baxter et al., 2022). There is a duplicity between the growing humanitarian impact on the world's most vulnerable, and the leisurely pace and ambition of mitigation and adaptation committed to date (United Nations Environment Programme., 2022). In this context, conversations about what role, if any, solar geoengineering¹ might play in either ameliorating or exacerbating climate impacts of the world's most vulnerable have come to the fore. For example, the US National Academies of Science, Engineering and Medicine recently called for \$200 M in federal funding for research, including on the social and ethical dimensions (National Academies of Sciences Engineering Medicine., 2021). Yet the debate is fraught with competing justice narratives. On the one hand, staunch opponents are calling for a non-use agreement (Biermann et al., 2022), which would, for example, ban all outdoor experimentation and public funding, and even shut down technological assessment within the Intergovernmental Panel on Climate Change (Biermann et al., 2022, p. 5). On the other hand, some supportive of research frame solar geoengineering as an "obligation to the global poor" due to its potential to possibly ameliorate the worst climate impacts while we continue to mitigate and adapt (Horton and Keith, 2016). The discussion was further complicated by a rogue private actor, Make Sunsets, which conducted small-scale outdoor

¹ Solar geoengineering is an emerging technology, which could ameliorate some climate impacts by scattering approximately 1% of incoming sunlight away from the Earth to lower global temperatures.



“We’re deploying our solar geoengineering mirrors, not only to reflect sunlight and cool the planet, but also to be the coolest.”

Feggo / CartoonStock.com

FIGURE 1

Deliberate attempts at intervening in the global climate are already taking place, with a diverse range of motivations.

deployment in Mexico in the absence of any community engagement nor scientific scrutiny or credentials (see Figure 1), an unthinkable prospect to many even a few years ago (Temple, 2022). In justifying their actions, Make Sunsets co-opted the humanitarian narrative, claiming “people [are] needlessly dying” and that they have a “moral obligation” to do this (Reynolds and Irvine, 2023, Episode 27). Notably, it successfully sold “cooling credits” to willing buyers (Temple, 2022). This for-profit deployment has been condemned by those at both ends of this debate and everywhere in between.

Despite these complex debates, one thing is clear: solar geoengineering, either its deployment or lack thereof, will have important consequences for the most vulnerable people and, by extension humanitarian needs (Suarez and van Aalst, 2017). This necessitates that humanitarians must enter the conversation. Despite some concerns that humanitarian framings of solar geoengineering too strongly privilege voices from the Global North (Stephens and Surprise, 2020), humanitarians are not a monolith, and neither are the most vulnerable people. More nuance is needed in the conversation about the humanitarian implications of solar geoengineering.

This Research Topic adds some nuance to the conversation by bringing together a range of articles that touch on its humanitarian implications, including related to modes of stakeholder engagement, peacebuilding, and learning lessons from the COVID-19 pandemic. These voices chart new territory between the competing justice narratives, inviting us to rethink the humanitarian narrative and help prevent its co-optation.

The article “*Environmental Peacebuilding and Solar Geoengineering*” by Buck argues that the fields of governance and international relations have viewed solar geoengineering as an approach that could exacerbate conflict, and not through the framework of environmental peacebuilding. Examining how and when environmental challenges can lead to cooperation rather than conflict, the paper concludes with suggestions for how to incorporate environmental peacebuilding aims into solar geoengineering work.

The article “*Different types of drought under climate change or geoengineering*” by Coughlan de Perez et al. reviews the literature and carries out new modeling to assess potential solar geoengineering implications as seen from two ways of understanding drought: “rainfall only” vs. “potential evapotranspiration.” With a focus on Africa, model results show that solar geoengineering deployment would have differential impacts across regions and sectors. For example, rainfed agriculture in southern Africa could see increased water availability under solar geoengineering, whereas reservoir managers in the Sahel and rainfed farmers in East Africa could see drought problems exacerbated by geoengineering. Disagreements as to whether, how, and how much solar geoengineering should be pursued in the future should be expected.

It is not possible to bring back conditions to a pre-existing climate embraced by all (see Figure 2). Tensions are inevitable, given that there will be winners and losers emerging from different choices. Thus, inclusive stakeholder dialogue is needed to understand and justify choices.



They want to know whose original climate we're restoring it to.

Kendra Allenby / CartoonStock.com

FIGURE 2

Solar geoengineering will not be able to restore the global climate to past rainfall and temperature conditions. Tensions about choices would emerge even if technology offered perfectly controllable options.



FIGURE 3

Stakeholder engagement is crucial for shaping solar geoengineering decisions with appropriate attention to humanitarian dimensions. Much remains to be done for successful design and implementation of participatory processes.

The discourse on engaging stakeholders (see Figure 3) on solar geoengineering research was elevated following the Sámi Council's successful objection to the initial test flight of Harvard University's

SCoPEX geoengineering research proposal. Planned for 2021 in Sweden, the proposed outdoor experiment was halted in part due to a lack of consultation with local communities. The independent SCoPEX Advisory Committee has since drafted guidelines for the SCoPEX research team to follow for community engagement if they choose to launch the project in future, and/or to serve as a model for any other future outdoor experiments conducted by other researchers (SCoPEX Advisory Committee, 2021).

Oksanen's article, "Dimming the midnight sun? Implication of the Sámi Council's intervention against the SCoPEX project," highlights the insufficient consultation in the SCoPEX planning process of its test flight on Sámi homeland, and the Sámi Council's alliance with environmental civil society groups opposed to geoengineering. Oksanen argues that this coalition is premised on an opposition between nature-based solutions on the one hand, and solar geoengineering as a tool to enable the persistence of extractive capitalism on the other. They further argue that this case cements indigenous communities as important stakeholders in solar geoengineering debates.

In, "Top Lesson from COVID for Solar Geoengineering: Anticipatory Research is Needed," Jinnah and Long explore lessons from anticipatory vaccine research to argue that anticipatory research is also critical for solar geoengineering. They argue that increased knowledge is critical for public confidence in any future decisions surrounding solar geoengineering—to either push it forward or to reject it (see Figure 4). Centrally, they argue that any anticipatory solar geoengineering research program must prioritize public safety, balance scientific goals with social concerns, ensure clear and transparent communication, and prohibit private interests from capturing decision making for profit.

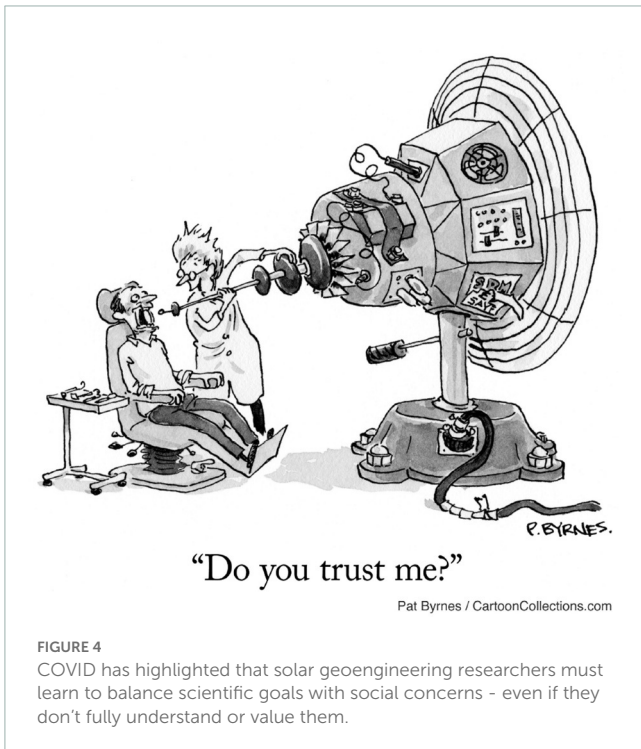


FIGURE 4
 COVID has highlighted that solar geoengineering researchers must learn to balance scientific goals with social concerns - even if they don't fully understand or value them.

The current state of affairs yields a world in which mitigation is not happening fast enough, adaptation does not go far enough, and Loss and Damage mechanisms are nascent at best (see Figure 5). This is a recipe for human suffering. At the same time, the pace of conversation on solar geoengineering has accelerated. Should humanitarians embrace solar geoengineering offerings as an imperfect, but possibly a better option than the consequences of not mitigating and adapting fast enough?



FIGURE 5
 Given the likely trajectory of our changing climate, humanitarians must anticipate, address and engage with the likely consequences of solar geoengineering decisions.

Until the humanitarian dimensions of solar geoengineering are fully explored, it is difficult to say, and there are many more dimensions to examine. This includes risk mitigation strategies, risk communication, humanitarian dimensions of equity and inclusion, security considerations, and shaping solar geoengineering governance to include perspectives of those most vulnerable and their potential disproportionate impacts.

Still to explore is the nuanced humanitarian ethical dilemma regarding whose views count as important, or which impacts are severe enough to trigger the usage of solar geoengineering, and what our choices say explicitly or implicitly about the answers to these questions. Similarly, and somewhat conversely, there is an ethical dimension to explore about the invocation of the most vulnerable as the justification for deploying solar geoengineering or not.

There are also questions of how humanitarians should or should not engage in this space while adhering to humanitarian principles. Humanitarians rely not only on their principles in general but the grounding in humanity in particular. We recognize that it is unrealistic to expect non-contentious dialogue on an issue that has existential ramifications, yet the polarization of humanitarian dimensions makes it more complex for humanitarians to navigate.

These start to scratch the surface of questions that the humanitarian community has to confront given the prospects of human suffering and changing risks under a human-made sky.

Author contributions

PS curated cartoons. All authors contributed to the manuscript conceptualization, drafting, and revision.

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Conflict of interest

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