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Some form of international regulation of solar climate engineering is needed, both to manage its benefits and to minimize and possibly compensate for its harmful impacts. There is no shortage of proposals for this. Many scholars argue that this should be developed within those existing legal institutions that have (near-) universal participation, and often toward binding rules.

For example, Albert Lin emphasizes the mandate and expertise of UN Framework Convention on Climate Change (UNFCCC) institutions, and states that its Conference of Parties (COP) should tackle climate engineering soon. Specifically, he envisions a Protocol allowing for non-consensual (i.e. super-majoritarian) decision-making, “with a default presumption against the implementation of any geoengineering project.” ¹ Similarly, Matthias Honegger and colleagues also argue that the UNFCCC is the logical site due to its legitimacy and scope, and the experience of its institutions.² Instead of calling for a Protocol, they note that the UNFCCC COP is already approving non-consensual resolutions and assert that a small coalition of powerful countries could operate within the UNFCCC architecture in order to guide solar climate engineering (solar radiation management, or SRM).

However, I believe that it would be counter-productive to pursue binding regulation of SRM in international forums with (near-) universal participation, and in those of the UNFCCC and CBD specifically, at least for the foreseeable future. In general, it is too soon to initiate global negotiations toward a binding agreement. The proposed technologies remain “imaginaries” and what they may be able to accomplish, how they would operate, their reversibility, their costs, and their risks all remain uncertain. What limited understanding we do currently have is from early-stage models and simplistic implementation scenarios.³ Moreover, we are far from political consensus regarding what we may (not) want from SRM. The lack of knowledge and agreed-upon objectives would lead to highly divergent state interests and an absence of negotiation focal points. Any re-

¹ Lin 2009, 23
² Honegger et al. 2013. From here onward, I use the abbreviations of the treaties as shorthand for their institutions.

⁴ Ibid, 135.
⁵ For example, the primary experimental SRM scenarios of the largest modelling project to date, the Geoengineering Model Intercomparison Project (GeoMIP) keep forcing constant, keep global average surface temperature constant, or use a set amount of injected aerosol. The experimental scenarios either stop abruptly or continue indefinitely. They are not optimized to balance residual temperature and precipitation anomalies, to vary with the time of year or with latitude, nor to merely slow down the effects of climate change. Likewise the researchers have not considered a gradual phase-out of SRM. This is not intended as a critique of the project, but instead to highlight the limited state of current modelling. Kravitz et al. 2011.
sulting binding agreement developed in the near term would lock us into commitments that may later seem unwise.

More specifically, consideration of SRM regulation in an international forum with (near-) universal participation is problematic. If representatives were to be aware of and rationally consider their countries’ vulnerabilities to climate change and how they might gain (or lose) through potential SRM implementation, then global negotiations might be potentially fruitful. However, this ideal is not the case now, and probably not for some time, in part due to the current low state of knowledge described above. Under this condition, it is likely that the more numerous developing countries would anticipate little gain from permitting industrialized countries to pursue and potentially implement a technology of uncertain benefit which, from the former’s perspective, might have the effect of liberating the latter from their mitigation obligations while granting them the power to shape other countries’ climate.⁶

Indeed, this appears to have been the case at the 2010 CBD COP, which produced a poorly worded, restrictive statement at the motivation of some developing countries.⁷ This understandable predisposition against SRM is exacerbated by the arguably pessimistic tone of the existing mainstream, policy, and academic discourses, which tend to emphasize climate engineering risks and obscure its apparent potential to reduce net climate risks.⁸ A prohibition, perhaps with only narrow exceptions, is a foreseeable result.

This would be undesirable because SRM appears to hold the potential to greatly reduce climate change risks, which are more severe in developing countries. A ban could also push field research to less responsible states, and may cause any eventual implementation—perhaps in response to sudden climate change—to be carried out based upon a comparatively thin knowledge base.⁹ Nevertheless, the countries which are interested in pursuing SRM research and may eventually have the capacity to implement it—which also tend to be relatively powerful—would likely not concede to such a proposal, resulting in either a stalemate, language which would be vague to the point of little use, or a prohibition without the participation of the countries with implementation capacity.¹⁰

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⁶ But see Reynolds 2014a.
⁷ Sugiyama and Sugiyama 2010, 8 note that “the information at the [COP] site was very limited and delegates were not well informed about the science of ge-engineering.” ETC Group, 2013 report that “The push… came largely from governments of the global South…”

⁸ This perception is empirically supported. For example, among policy documents (including national and international, as well as governmental, intergovernmental, and nongovernmental) which discuss climate engineering, more than twice as many express concerns than hopes. Huttunen et al. 2014, 10. An unpublished survey of 101 articles on climate engineering in 18 major news sources in three countries indicates that, among articles which discuss SRM, 50% are negative, 47% are balanced, and 3% are positive. Twenty-three percent of these SRM articles mention no potential benefits while 94% bring up one or more risks. Elblaus, 2014, 4, 7, and personal communication. David Keith found that roughly half of all results from a Google search on climate engineering discussed the concern that SRM would dramatically reduce the summer monsoon in south Asia, a result from early modelling which more recent work has shown to likely be a relatively minor problem. Keith 2013, 55. In the academic discourse, I am most familiar with international law, where almost all reviews consider how climate engineering should be regulated to reduce its own risks yet do so without considering how it might reduce climate change risks. Reynolds 2014c, 427-434.


¹⁰ Victor 2008, 331.
Specifically, the UNFCCC possesses some particular drawbacks. First, its negotiations are already highly politicized, and arguably dysfunctional; stirring the pot with SRM is unlikely to be fruitful. Second, the negotiators and staff there are strongly committed to the dominant paradigm of mitigation and adaptation, and the institutional culture might be hostile to SRM. Finally, several current and proposed provisions currently under the UNFCCC, such as the Green Climate Fund, the Loss and Damage Mechanism, technology transfer, the Clean Development Mechanism, and potential future allocations of international emissions credits, would transfer large amounts of wealth from rich to poor countries. Potential recipients of these transfers may believe that SRM could undermine the justifications of these mechanisms, and consequently resist its serious consideration.

The CBD fares worse. It would be a stretch of its mandate to develop detailed regulations for activities to reduce climate risks. If the CBD were to attempt this, it would need the close cooperation of the UNFCCC, whose staff may feel that its administrative domain is being infringed upon. Moreover, if the experience of genetically modified organisms is any guide, the politics of the CBD may cause its climate engineering policy to be based upon opposition to the practice itself rather than a weighing of its potential benefits for and risks to biodiversity. Finally, the United States—the world’s leading research state—is not a party to the CBD.

It is better to conceptualize the unfolding of international regulation of SRM as a process instead of a singular, final, and known destination. Assuming that the technologies are actually developed, they will pass through various stages, each presenting different problem structures. In the short term, we need more knowledge of their capabilities, risks, means, costs, and reversibilities. These can be improved through research, including field tests which can gradually and cautiously increase in scale and perturbation. For the time being, the risks of these can be managed through existing national and international environmental law, institutions, and norms. This research should be internationally funded and coordinated, but not made monolithic in a manner that drowns out sceptical views. Meanwhile, we need to work toward consensus as to what we do and do not want from climate engineering and its research. This requires engagement with the public and policy makers; for well-informed, balanced debate; and for the continuation of norm development. At some time, these norms should be

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11 On the other hand, the UNFCCC has become increasingly receptive to adaptation, which for many years was somewhat off-limits. The situation with regard to SRM could similarly change.
12 For a discussion of these transfers’ rough magnitudes and some problematic implications, see Posner and Weisbach 2010. This is a key criticism of emissions permits among economists. See Cooper 2010.
13 Although Bodle et al. discuss regime complexes, in which multiple international institutions govern a particular issue area, they provide no specifics as to how the CBD and the UNFCCC would cooperate. Bodle et al. 2014, 134, 174.
operationalised into more detailed guidelines and best practices. In these processes, an international institution could help to facilitate and coordinate research, to foster international cooperation, to provide a site for norm development and operationalisation, and to help ensure that field experiments are responsibly conducted. This need not be highly legalized, but if field work increases in scale and perturbation, greater legalization would be warranted.\textsuperscript{17} Regardless, all of the researching countries should be represented here.

Looking much further ahead, if a deployable SRM technology were eventually developed, an international institution that takes a managerial approach, described above, might be adequate to prevent its misuse, but under some conditions a multilateral agreement would be warranted. Even if only a few countries would be capable of global implementation, and would thus be the only ones which \textit{must} participate in its regulation, for both normative and political reasons a larger—although not necessarily universal—forum would be preferable. The UNFCCC institutions, or perhaps those of the CBD, may or may not turn out to be an effective site for this.

Regardless, I assert that it is presently not a relatively productive endeavour to dwell on how states might collectively govern technologies which do not yet exist; whose forms, benefits, risks, costs, and reversibilities remain unknown; and under what circum-

\textsuperscript{17} See the examples of internationally coordinated scientific research in Ghosh 2014 in this volume. An example of an international institution with a managerial approach to scientific research and the responsible conduct thereof is the International Atomic Energy Agency. See Reynolds 2014c.
Works Cited


