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Geoengineering, Political Legitimacy and Justice

Stephen M. Gardiner[a] and Augustin Fragnière[b]

[a]University of Washington, Department of Philosophy, Seattle, USA; [b]University of Lausanne, Sustainability Center, Lausanne, Switzerland

1. Context

Geoengineering is commonly defined as 'the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change' (Royal Society, 2009, 1). Technologies which might be deployed to attempt geoengineering are either speculative or only in the very early stages of development. Those currently being considered fall into two main camps. Carbon Dioxide Removal (CDR) techniques aim to decrease climate change by withdrawing significant amounts of carbon dioxide, the main anthropogenic greenhouse gas, from the atmosphere. Proposed methods include direct air capture, ocean fertilization, enhanced weathering, and large-scale afforestation. Solar Radiation Management (SRM) technologies endeavor to offset the warming effects of rising greenhouse concentrations by decreasing the amount of energy the Earth's surface receives from the Sun, usually through increasing the planet's albedo (i.e. its reflectivity). In the early literature, the techniques attracting most attention are spraying sulfate particles in the stratosphere (stratospheric sulfate injection or 'SSI') and marine cloud brightening ('MCB'). Other possibilities include making deserts, oceans and roofs more reflective.

Despite their speculative nature, discussion of geoengineering technologies is growing rapidly in science and policy circles. Having for decades largely been dismissed as irrelevant or counterproductive to serious discussion, some now advocate for geoengineering techniques as possible 'tools in the toolkit' for future climate action. This 'partial mainstreaming' began in 2006 when Paul Crutzen, a prominent atmospheric chemist, argued that serious research was needed because of ongoing political inertia on reducing global emissions (Crutzen, 2006). Crutzen's focus was on stratospheric sulfate injection. He stressed that SSI was 'by far not the best solution' (212) and that 'the very best would be if emissions of the greenhouse gases could be reduced so much that the stratospheric sulfur release experiment would not need to take place' (217). However, he also insisted that 'currently, this looks like a pious wish' (217).

Crutzen's intervention was controversial in the science community. Nevertheless, in the intervening decade or so, discussion of geoengineering has developed at a considerable pace. In particular, a number of reports from scientific academies (e.g. Royal Society, 2009; National Research Council, 2015) and policy institutes (e.g. Bipartisan Policy Center 2011; FCEA 2018) have emerged. Notably, such reports typically remain cautious (even skeptical) about climate engineering, emphasize the priority of

CONTACT Stephen M. Gardiner smgard@uw.edu University of Washington

mainstream mitigation strategies, but also suggest that additional research is needed. Meanwhile, a significant and growing academic literature has developed on geoengineering science, policy, ethics and governance.

Soon we may come to think of this as a relatively comfortable transition period, during which discussions of geoengineering were no longer dismissed as completely fanciful or taboo, but nevertheless remained relatively contained and largely academic. However, that period might now be drawing to a close. Mainly this is because over the last decade the failures of the international response to climate change have turned from deeply disturbing to outright alarming. Global emissions are now up by more than forty percent since the early nineties, when the international community committed itself to avoiding 'dangerous anthropogenic interference' with the climate system (UNFCCC 1992). In addition, recent political developments mean that the prospects for meeting mainstream climate targets currently look bleak. In particular, the scientific community stated just last month (October 2018) that at this point a *transformative political effort* is required to meet the aspirational international goal of limiting global temperature rise to 1.5 degrees Celsius agreed in Paris (2015), which many believe is necessary to prevent severe harms, especially to vulnerable populations (IPCC 2018). Worse still, the more prominent 2 degree target is also under threat.

Strikingly, most of the pathways forward considered by the IPCC already assume significant use of CDR. The report states: 'All pathways that limit global warming to 1.5℃ with limited or no overshoot project the use of carbon dioxide removal (CDR) on the order of 100–1000 GtCO2 over the 21st century'. Moreover, they add that even this may not be enough: 'reversing warming after an overshoot of 0.2℃ or larger during this century would require upscaling and deployment of CDR at rates and volumes that might not be achievable given considerable implementation challenges'. Given this, geoengineering advocates argue that we have already entered the realm where we should push hard to develop the necessary technology for SRM and conduct field experiments. For example, at least two outdoor experiments are currently in preparation, by groups at Harvard University (for SSI) and the University of Washington (for MCB).

In our view, under such circumstances it is urgent that normative reflection be undertaken now to provide us with guidelines and policy recommendations. It is widely held that the ethical and governance challenges of geoengineering are at least as daunting as the technical challenges, and perhaps more so (Gardiner, 2011; Keith, 2013; Royal Society, 2009). Reasons for this include that, although geoengineering technologies might provide some benefits in the fight against climate change, they may also bring about significant harm, result in serious disparities, and create new risks. In addition, such technologies pose difficult questions about who should control them, what principles should govern their choices, and what responsibilities those engaged in geoengineering would have to humanity and the rest of nature.

The academic literature provides several proposals of general principles for geoengineering governance (e.g. cf. Gardiner & Fragniere, 2018; Jamieson, 1996; Rayner et al., 2013). The aim of this special issue is to move forward the normative discussion of *political legitimacy* and *justice* specifically. Our starting assumption is that it would be unwise to proceed with particular technologies and develop governance systems without at the same time addressing hard questions about justice and legitimacy. One reason for this is that clarifying the central normative questions is key to understanding

obstacles to, parameters for, and constraints on research, policy and governance. In particular, it matters for policy if some kinds of geoengineering turn out to be easier from the point of view of justice and legitimacy than others. Suppose, for instance, that reasonably legitimate forms of stratospheric sulfate injection turn out to be much more difficult to achieve than comparable forms of carbon dioxide removal (e.g. because SSI encourages concentrations of power that make political legitimacy harder). Or suppose that some ways of doing solar radiation management (e.g. marine cloud brightening) are easier to calibrate and so have better prospects for justice than SSI. In our view, such normative and, in essence, ethical lessons are central to geoengineering research, policy and governance. Hence, any actual pursuit of geoengineering ought not proceed without tackling the ethical questions head on.

2. Structure of the Special Issue

This special issue draws on papers initially presented at the conference *Geoengineering: Political Legitimacy and Justice* which took place at the University of Washington in Seattle in November 2017, and was sponsored by the National Science Foundation [Grant 1549983]. The conference brought together scholars from different disciplines (philosophy, political science, law, atmospheric sciences) to consider how a just and legitimate governance system for geoengineering technologies should be designed. It is the first of a two conference sequence, the second of which recently took place at the University of Reading in the United Kingdom.

The first three papers focus on the need to take a broad approach to justice in assessing geoengineering policies. The prominent geoengineering scientist David Keith and his group at Harvard have recently been arguing that we have a moral duty to the world's poor to pursue research and development of SRM, and especially SSI (Horton & Keith, 2016). In the first paper, Marion Hourdequin argues that a consequentialist and distributive conception of justice is too narrow a perspective on which to ground such a duty. Instead, she proposes a multidimensional account of climate justice that encompasses distributive, procedural and recognitional considerations. Such an approach is necessary in part because, she argues, 'the current concentration of power in relation to SRM research and development is untenable' and encourages 'paternalism, parochialism, and expertise imperialism'. By contrast, a multidimensional approach to climate justice does a better job of taking seriously the interests and the participation of 'the global poor' in geoengineering decisions.

The second and third papers echo this theme. In the second, Kyle Powys Whyte provides insights into problems of multidimentional justice by drawing on the historical experiences of indigenous peoples. Whyte shows how intricately tied questions of climate and geoengineering justice are with other forms of domination and vulnerabilities, especially for those who have been confronting radical environmental change for a very long time because of forced displacements.

In the third paper, Christopher Preston and Wylie Carr develop a care based approach to assessing the justice of geoengineering schemes. Contrary to the dominant distributive paradigm, their approach focuses on recognitional justice, and elements such as context, relationships, power and vulnerability. They illustrate their method with case studies conducted in Kenya, the Solomon Islands and the North American Arctic.

The next three articles deal with the regulation of geoengineering research and deployment, in particular in the case of SRM, either through the lens of legitimacy or by reference to risks of domination. In the fourth paper, Daniel Callies notes that even though most people involved in the geoengineering debate agree that legitimate governance is necessary if we want to move forward with research and development, there is still little discussion among political philosophers about what would constitute legitimacy in this case. To fill this gap, Callies proposes a set of normative principles for geoengineering that emerge from a particular conception of legitimacy developed out of Allen Buchanan's approach to institutional legitimacy.

In the fifth paper, Patrick Taylor Smith investigates the risk of domination entailed by SRM research. Building on republican theories of justice as non-domination, he argues that even indoor SRM research can alter power relations between countries, and that a governance regime should not rely only on western scientists constraining themselves. Smith also maintains that transparency and information-sharing is not enough to avoid the potential domination of developed countries by developing countries. Strikingly, he concludes that one way to respond to this worry would be for the developed world to facilitate geoengineering capacity-building *in developing countries*.

Sikina Jinnah, Simon Nicholson, and Jane Flegal investigate questions of legitimacy and governance with respect to SRM research in the context of proposed outdoor experiments in the United States. They argue that public engagement is a necessary condition for any legitimate governance regime, but that it is not sufficient. Building on the orchestration theories of governance, they contend that a few crucial U.S. states have an important role to play in geoengineering governance, and propose the creation of state-level advisory commissions to oversee SRM research.

In conclusion, the contributions to the special issue extend existing discussions and tackle questions that have often been overlooked in debates about geoengineering governance. Taken together, they constitute a good starting-point for thinking about how we might be entering a new era in climate action and global politics, whether we want to or not.

Disclosure statement

No potential conflict of interest was reported by the authors.

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