Christopher Preston, ed. *Engineering the Climate: The Ethics of Solar Radiation Management*. Lanham: Lexington Books, 2012. ix, 267 pages.

This important edited collection addresses ethical issues associated with solar radiation management (SRM), a category of climate engineering techniques that would increase the planet's reflectivity in order to offset some of the impacts of anthropogenic climate change. Such techniques include injecting sulfate aerosols into the stratosphere or brightening marine clouds with seawater. Although SRM has the potential to cool the planet by reducing the amount of incoming solar radiation absorbed by the planet, it raises a wide array of difficult and interesting ethical issues. *Engineering the Climate* makes an important contribution to addressing many of these issues.

The collection is composed of an introduction and thirteen original contributions from various authors. Space limitations make it impossible to discuss each essay in detail, so I shall instead focus my remarks on those contributions I suspect would be of most interest to likely readers of this journal, although I will mention all the essays in the book.

Apart from the introduction, in which Christopher Preston offers a helpful overview of the "ethical terrain" of SRM and concisely sketches each contribution, the book is divided into five sections. The first of these, "Present and Future Generations," includes essays by Marion Hourdequin ("Geoengineering, Solidarity, and Moral Risk"), Konrad Ott ("Might Solar Radiation Management Constitute a Dilemma?"), and Patrick Taylor Smith ("Domination and the Ethics of Solar Radiation Management").

Hourdequin argues that SRM poses a particularly worrisome threat to climate justice, namely that it could undermine moral solidarity, thus making a just, long-term solution to climate change more difficult to achieve. This is so for three reasons. First, SRM could diffuse the energy, attention, and resources we have available to spend on solutions to climate change. Second, SRM could introduce new inequities disfavorable to parties who are already disadvantaged in other repsects, thus creating additional divides between currently existing groups. Third, SRM could exacerbate intergenerational injustice, potentially harming future persons by committing them to the risks of both SRM and past greenhouse gas emissions, thereby producing a divide between present and future generations. Hourdequin advocates cultivating moral solidarity "through a sense of our common humanity and an empathetic understanding of one another as living beings with interests, needs, and vulnerabilities" (p. 30). If SRM indeed threatens such endeavors, then we have some ethical reason to be wary of SRM. I do wonder, however, how strong this objection to SRM is in practice. Arguably, humanity's current moral solidarity is regrettably rather weak, and so further threats to it might be less worrisome than they would be if our solidarity was currently robust. Still, it might be reasonable to hope that we can substantially enhance moral solidarity in the future, and in that case we would have reason to avoid new pursuits that threaten this project.

Konrad Ott argues that SRM deployment would impose a moral dilemma on future generations, because future persons may have strong moral reasons both to stop SRM (e.g., to avert harmful side-effects of it) and to continue SRM (e.g., to avoid the risks tied to the rapid global warming

that would result from discontinuing SRM). He reasons that it is "morally repugnant" to pursue actions that risk imposing dilemmas on others, and so it would be morally repugnant for the present generation to deploy SRM. Ott acknowledges that SRM might not yield a genuine moral dilemma in the sense understood by many moral philosophers, for it might turn out that some future generation has an all-things-considered reason to opt for either continuing or stopping SRM (p. 40). I would add that genuine moral dilemmas are usually understood to be cases in which it is impossible to avoid moral wrong-doing, and it is not clear that some future generation would act wrongly in either stopping or continuing a project to which they did not consent. Nonetheless, should humanity opt to deploy SRM, Ott makes a plausible case that future generations would then face a very difficult choice.

Taylor Smith contends that "SRM as the sole or primary response to climate change" would be "deeply problematic" because it would exacerbate the present generation's domination of future generations (p. 59). Domination occurs when one party arbitrarily exercises superior power over another party and thereby constrains the options available to the latter. If the present generation deployed SRM without accompanying emissions mitigation and adaptation, they would dominate the future. This is because, as we have already seen in Ott's contribution, future persons would be faced with either maintaining SRM (and tolerating any ills associated with it) or stopping SRM (and facing the severe risks of abrupt warming in the wake of cessation). Importantly, this would still count as domination even if we assume that SRM would secure a decent standard of living for those future persons, for this would simply be a fortunate outcome of the past generation's arbitrary exercise of power. However, Taylor Smith rightly notes that these considerations do not entail that SRM could never be ethically permissible, for "a limited use of SRM *might* make it easier to mitigate or adapt and could be *temporarily* justified on those grounds," but we would first need to be "reasonably confident that its temporary use as a part of the solution would not evolve into something more permanent and all-encompassing" (p. 59).

The next section, "Marginalized, Vulnerable, and Voiceless Populations," includes essays by Kyle Powys Whyte ("Indigenous Peoples, Solar Radiation Management, and Consent"), Christopher Preston ("Solar Radiation Management and Vulnerable Populations: The Moral Deficit and its Prospects"), and Ronald Sandler ("Solar Radiation Management and Nonhuman Species").

Powys Whyte argues that the consent of Indigenous peoples should be sought in advance of conducting SRM research. Historically, many advocates of projects having a substantial environmental impact (e.g., dam-building in the United States) have not sought the consent of Indigenous stakeholders. Powys Whyte worries that this may also occur with research and development of SRM projects. For example, some proponents of SRM research might favor seeking Indigenous peoples' consent only after research has been planned and begun, but Powys Whyte says that consent (or dissent) at that stage would be "meaningless" (p. 66). To avert a situation like this, Powys Whyte argues for a free, prior, and informed consent model when it comes to SRM research planning, one in accordance with Indigenous peoples' "customary laws and decision-making processes" (p. 75).

Sandler's contribution will be of particular interest to many readers of this journal, given how little has been written on SRM from an explicitly non-anthropocentric perspective. He argues

that we have good moral reason both to value non-human species in their own right and to work to preserve them. Sandler contends that "the value of species" supports aggressive emissions mitgation but does not support SRM, given that the latter does not address some of the ecological harms driven by greenhouse gas emissions (e.g., ocean acidification) and is likely to be hard to predict and control. Interestingly, he also argues that the value of species does not necessarily *oppose* SRM, because "there may be contexts that would already be sufficiently bleak from the perspective of the value of nonhuman species that SRM would not pose a significant further threat to their value" (p. 108). However, it seems that whether the value of species supports or opposes SRM would depend crucially on the context in which SRM might be pursued. Sandler writes that SRM "would not be an effective approach to preserving the human independent natural historical value of species" (p. 107). This is very plausible if we compare an "SRM world" to a pre-industrial one, but SRM is on the table precisely because we are missing our opportunity to maintain something close to the pre-industrial climate. That being the case, perhaps in the future no feasible climate policy will do well when it comes to preserving the value of species, but it would be surprising if some approaches were not significantly better (or less bad) than others.

The volume's third section, "Moral Hazards and Hidden Benefits," includes contributions from Ben Hale ("The World that Would Have Been: Moral Hazard Arguments Against Geoengineering") and Holly Jean Buck ("Climate Remediation to Address Social Development Challenges: Going Beyond Cost-Benefit and Risk Approaches to Assessing Solar Radiation Management").

Hale addresses the idea that succesful deployment of SRM, and perhaps merely the prospect thereof, would pose a moral hazard, or "the danger that, in the face of insurance, an agent will increase her exposure to risk" (116). He successfully argues that appeals to an SRM-induced moral hazard are indeterminate. First, such appeals are ambiguous in that they could express any of three distinct worries: that SRM would allow us to avoid making changes to our emissions-intensive behavior, that SRM will inevitably become part of business as usual, or that SRM would encourage certain "perverse" behavior (e.g., increasing our emissions). Second, appeals to an SRM moral hazard are vague, because they can be formulated in many ways. Hale discusses sixteen such formulations, which fit into three categories: considerations of efficiency (e.g., that SRM will be militarized), of responsibility (e.g., that SRM will encourage free-riding), and of vice (e.g., that SRM will invite hubris). Because of the many different things that someone might have in mind when claiming that SRM poses a moral hazard, Hale argues that general appeals to it are not helpful and that we should instead attend to specific arguments regarding the moral problems SRM might carry.

Sections four and five speak less obviously and directly to many of the concerns of environmental philosophers, but the contributions therein are both interesting and of a high quality. The fourth section, "Ethics of Framing and Rhetoric," features Dane Scott ("Insurance Policy or Technological Fix? The Ethical Implications of Framing Solar Radiation Management") and Wylie Carr, Ashley Mercer, and Clare Palmer ("Public Concerns about the Ethics of Solar Radiation Management"). The piece by Carr et al. presents and explores empirical evidence from a survey of public attitudes toward SRM, including evidence that the general public is concerned about a range of ethical issues.

The last section of the volume, "The Cultural Milieu," includes essays by Albert Borgmann ("The Setting of the Scene: Technological Fixes and the Design of the Good Life"), Forrest Clingerman ("Between Babel and Pelagius: Religion, Theology, and Geoengineering"), and Maialen Galarraga and Bronislaw Szerszynski ("Making Climates: Solar Radiation Management and the Ethics of Fabrication"). Clingerman's piece will be of particular interest to those interested in religious approaches to the ethics of SRM.

Although research on SRM in the humanities and in the natural and social sciences has steadily grown since the book's publication in 2012, the volume is not outdated. This is partly because many of the basic ethical issues surrounding SRM remain unresolved or under-explored. Moreover, *Engineering the Climate* is currently the only book wholly devoted to the ethics of SRM. Combined with the fact that the contributions in this volume are consistently of high quality, this makes the book essential reading for any researcher interested in the ethics of climate engineering. It will also appeal to those interested in climate ethics more broadly. I highly recommend this volume to anyone sharing these interests.

Toby Svoboda
Department of Philosophy
Fairfield University
1073 N. Benson Rd.
Fairfield, CT 06824
tsvoboda@fairfield.edu