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Living the global social experiment: An analysis of public discourse on solar radiation management and its implications for governance

Phil Macnaghten [a,b,*], Bronislaw Szerszynski [c]

[a] Department of Geography, Science Laboratories, Durham University, South Road, Durham DH1 3LE, UK
[b] Department of Science and Technology Policy, Institute of Geosciences, P.O. Box 6152, State University of Campinas – UNICAMP, 13083-970 Campinas, SP, Brazil
[c] Centre for the Study of Environmental Change, Department of Sociology, Bowland North, Lancaster University LA1 4YT, UK

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ABSTRACT

Solar radiation management techniques are a class of geoengineering methods designed to reflect some of the inbound sunlight back into space with the intended effect of arresting further warming of the planet and thus counteracting global warming. In this article we examine current debates on solar radiation management governance, clarifying a number of assumptions that persist and why these require further scrutiny. Building on existing research we articulate a more critical role that the social sciences should be playing in public engagement with solar radiation management. We develop a deliberative focus group methodology that aims to open up deliberation on the technology, focusing explicitly on the kinds of world that its deployment would bring into being. Our findings, based on an analysis of public discourse, suggest that solar radiation management would be publicly acceptable only under very specific, and highly contingent, conditions. Given the sensed implausibility of these conditions being realised in the real world, we set out the implications for solar radiation management governance. We explain why solar radiation management was perceived as likely to create a particular kind of world, one with an increased probability of geopolitical conflict, a new condition of global experimentality, and major threats to democratic governance. How to bring these issues into solar radiation management governance entails an important but challenging role for the social sciences.

1. Introduction

1.1. The emergence of geoengineering as a policy option

There has been a recent and rapid growth of interest within the scientific and policy community in exploring a range of techniques, collectively termed 'geoengineering' (or alternatively 'climate engineering'), for deliberatively intervening in the climate to counteract global warming (American Meteorological Society, 2009; Bipartisan Policy Centre Task Force, 2011; Royal Society, 2009; United States Government Accountability Office, 2011). Within the space of a few years, and with the endorsement of learned societies and governance institutions, geoengineering has been transformed from a topic discussed largely in science fiction and esoteric scientific papers into mainstream scientific and policy debate. One class of method of geoengineering, termed solar radiation management, has received particular attention. Solar radiation management techniques are intended to reflect some of the inbound sunlight back into space with the effect of reducing global warming. This contrasts with carbon dioxide removal techniques, which attempt to address the root cause of climate change by removing greenhouse gases from the atmosphere, and which are seen by many as safer, but slower and more expensive. For the purposes of this paper we will focus on solar radiation management.

There are a number of ways of explaining the rise of solar radiation management as an emergent policy discourse. First, the slow progress of international climate negotiations has led to concerns that current mitigation policies may not produce the necessary reductions in emissions that are necessary to avoid dangerous climate change. Second, proponents of the technology argue that solar radiation management could not only reduce global temperatures relatively quickly, perhaps within a few months of deployment, but also relatively cheaply, relative to the cost of implementing greenhouse gas emissions reductions (Boyd, 2008; Caldeira and Keith, 2010; SRMGI, 2011). Geoengineering is thus becoming seen as a third policy route for responding to climate change, alongside mitigation and adaptation (Nurse, 2011).

1.2. The debate about geoengineering governance

The policy debate on geoengineering governance and regulation is in its infancy. There currently exist no international treaties that cover all geoengineering techniques, although it is widely

* Corresponding author. Tel.: +55 19 3308 5956.
E-mail addresses: p.m.macnaghten@durham.ac.uk (P. Macnaghten), bron@lancaster.ac.uk (B. Szerszynski).

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assumed that most techniques could be covered by an extension of existing treaties (Royal Society, 2009; SRMGI, 2011). Nevertheless, there have been some early statements by policy bodies. In 2010, for example, the 193 member United Nations Convention on Biodiversity declared that there should be no field tests of geoengineering projects that might affect biodiversity (Convention on Biological Diversity, 2010), while in October 2011 the European Parliament expressed 'its opposition to proposals for large scale geo-engineering' (Marshall, 2011). Such statements are not legally binding; but they nevertheless reflect early political unease with the prospect of geoengineering taking place without adequate regulatory arrangements (see also Virgoe, 2009; Lempert and Prosnitz, 2011; Olson, 2011; SRMGI, 2011).

A number of initiatives have occurred in recent years, aimed at articulating the goals and possible form of geoengineering research governance. These include: (1) the establishment of the 'Oxford Principles' for the responsible conduct of geoengineering research, submitted and adopted by the UK House of Commons Science and Technology Committee and subsequently approved by the Scientific Organising Committee at the Asilomar International Conference on Climate Intervention Technologies (Rayner et al., 2010; Asilomar Scientific Organizing Committee, 2010); (2) the development of a framework for responsible innovation aimed at guiding assessment on whether the UK Stratospheric Particle Injection for Climate Engineering (SPICE) research project's proposed test-bed – the United Kingdom's first field trial of solar radiation management technology – should be permitted (Macnaghten and Owen, 2011); and (3) the Solar Radiation Management Governance Initiative (SRMGI) – an international, NGO-driven initiative aimed at examining in depth the governance issues raised by research into solar radiation management methods (SRMGI, 2011).

There is still considerable diversity of opinion about exactly what form geoengineering governance should take. However, there seems to be an emerging consensus that it should involve a combination of soft law and hard law, be guided by principles such as 'the public interest' and transparency, and involve 'upstream' engagement with wider stakeholders and the public (Corner et al., 2012; Rayner et al., 2010; SRMGI, 2011). It is also argued that governance during the research stage might be relatively 'soft' to permit or even encourage 'safe', laboratory or small-scale research (with proposed governance mechanisms ranging through laissez-faire permissiveness, self-regulation, independent national policies, to an informal consortium of countries); however, most argue that governance would have to become 'harder' before any large-scale field research or deployment, probably through a multilateral, international body such as the United Nations (Virgoe, 2009; SRMGI, 2011).

However, despite the growing sophistication of the debate around solar radiation management governance, a number of assumptions persist in the policy literature that require further scrutiny. Firstly, it is assumed that debates around solar radiation management are debates about a unified, stable, technological object, about which different people might make different knowledge claims, or to which they might attach different values, rather than a more complex conversation in which the very nature of geoengineering is put into question. Secondly, it is assumed that it is in principle possible to make a clear distinction between research into, and deployment of, solar radiation management. This assumption manifests in the beliefs that meaningful research into the feasibility of these techniques can be carried out before deployment, and that this research will help ensure that any future deployment would be less likely to involve major surprises.

Thirdly, it is assumed that the development of solar radiation management is similar enough to earlier episodes of technoscientific innovation that future governance processes will be able to follow existing and emerging frameworks of technology assessment, such as those of responsible innovation, 'upstream' public engagement and real-time technology assessment (Barben et al., 2008; Corner et al., 2011, 2012; Macnaghten and Owen, 2011). Fourthly, it is assumed that new institutional arrangements for the proper regulation of geoengineering can in principle be built on existing international instruments used to regulate transboundary issues, and more generally can be accommodated within the structures of democratic national and international governance (see discussion in Virgoe, 2009). Fifthly, it is assumed that survey, qualitative and public engagement research can help clarify public attitudes to solar radiation management (see Ipsos-MORI, 2010; Leiserowitz et al., 2010; Mercer et al., 2011; Parkhill and Pidgeon, 2011; Pidgeon et al., 2012; Poumadere et al., 2011; Spence et al., 2010), and that the main role of such research should be to incorporate value-based considerations about geoengineering into decision-making (see Corner et al., 2012 for a review). Notwithstanding the importance of such research, what has been insufficiently explored is how public engagement methods can be used to explore *the kinds of world* that solar radiation management techniques might bring into being, and thereby to critically explore the assumptions that underpin governance debates around this technology.

1.3. Solar radiation management geoengineering, the social sciences and the public

In this section we argue that, as solar radiation management is becoming more clearly formed as a policy option, it is taking on a particular 'social constitution' – a distinctive set of implications about the sort of world that its deployment would likely bring into being (Grove-White et al., 2000; see also Kearnes et al., 2006, p. 301). This social constitution renders problematic the assumptions listed above, and thereby will make solar radiation management particularly difficult to accommodate within conventional understandings of governance. Building on existing public engagement research on geoengineering we go on to articulate a more critical role that the social sciences should be playing in public engagement with solar radiation management.

First, unlike many technoscientific issues, the distinctiveness of solar radiation management does not lie in the use of novel technologies with new properties: the actual interventions themselves typically involve mundane technologies such as mirrors, iron dust, sulphate particles or crumbled rock, albeit deployed at a very large scale. Its novelty rather lies in the intention to use these technologies to establish a radically new relationship between society and nature, through a project of bringing planetary systems under human control and the 'making' of new climates (Galarraga and Szerszynski, 2012; see also Corner et al., 2012; Hulme, 2012; Ipsos-MORI, 2010).

Second, even though existing research has highlighted public concerns over the unintended consequences of solar radiation management (Corner and Pidgeon, 2010; Pidgeon et al., 2012), we go further to suggest that solar radiation management has a distinctive and constitutive relationship with uncertainty. With most technologies, it is the side-effects that are likely to be hard to predict and difficult to attribute, because of the way that they often depend on stochastic processes. It is this feature of many contemporary technologies which led Ulrich Beck to suggest that we now live in a 'risk society' (1992), one pervaded by unwanted and probabilistic side-effects of modernisation. But with solar radiation management techniques, because even the intended effects are probabilistic – since their goal is to affect statistical constructs such as 'global average temperature' through intervening into an earth system which is highly chaotic and in a constant process of formation – uncertainty becomes even more unavoidable.