
Geoengineering and geologic politics

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Abstract. Early engagement with geoengineering by social scientists indicates a certain suspicion over the motives and modes of operation of scientific research in the field. In part, this reflects the prominence of the critique of the politics of emergency in recent social and political thought: a thematisation that links securitisation measures with foreclosures of the political. This paper turns the attention back on the social sciences, arguing that recent styles of ontological and political thought do not prepare us well for engaging with geologic issues in general, and geoengineering in particular. It is suggested that, rather than viewing geoengineering discourses and imaginaries as a retreat from politics, we might view them as playing an important role in opening up new kinds of politics oriented towards earth systems and their dynamics. This new ‘geologic politics’ involves a turn from issues hinging on territorial divisions of the earth’s surface toward the strata that compose the deep temporal earth. As a political challenge, the question of how to live with dynamic and stratified earth systems not only promises to extend the scope of politics, but also points to the ‘inhuman’ limits of the political per se.

Keywords: geoengineering, climate change, geologic politics, earth systems, politics of emergency

Introduction

“The media loves to play up the angle of hubristic geoengineers hell-bent on messing with a system they don’t understand”, notes environmental journalist Jeff Goodell (2010). In their initial responses to geoengineering, social scientists seem to share with their media counterparts a certain suspicion of technoscientific motives and modes of operation. Such doubts generally come coupled with the assumption that the social sciences themselves are well equipped to make a vital contribution to the question of how best to address the global climate predicament.

In this paper I turn the spotlight back on the social sciences and ask how well our own imaginaries, concepts, and preoccupations prepare us to engage with developments in geotechnics. The way that the geoengineering problematic is unfolding appears to have strong affinities with the ‘politics of emergency’ and accompanying ‘depoliticising’ tendencies that are a prominent theme in recent social and political thought. In this light, a turn towards technocratic responses to the global climate situation looks to be paradigmatic of a retreat of the political—in keeping with imperatives to ‘secure’ contemporary life against crisis and uncertainty.

But what if we were to up-end this argument, and ask whether it might be geoengineering that is *extending* the reach of politics while the social sciences are *restricting* the scope of the political? I suggest that thinking in terms of active responses to the climate predicament is helping prise open a novel ‘geologic’ dimension in contemporary politics. In particular, geoengineering debates are beginning to put questions about how best to work with and across thresholds in earth systems on the political agenda. Such an engagement with earth

processes and their dynamics, I argue, is precisely what is lacking in prevailing styles of social and political thought. This geologic shortfall, I argue, extends into human geography—even into those approaches that afford ontological and political salience to the ‘more-than-human’.

It is vital to be attentive to the political and ethical implications of geotechnics in ways that play to the disciplinary strengths of the social sciences. But I suggest that, if we wish to do more than simply react to initiatives by natural scientists and engineers, social scientists may have to immerse themselves more deeply in the kind of analytic, experimental, and even speculative engagements with the workings of the earth that the geoenvironmental field is advancing. This has implications not only for how we might conceive of an emergent *geologic politics*, but for how we might think about the contours and coverage of the political more generally.

Geoenvironmental and the politics of emergency

In an essay often credited with establishing geoenvironmental on the climate governance agenda, atmospheric chemist Paul Crutzen notes with alarm the total failure of efforts to get anthropogenic greenhouse gas emissions under control. He observes: “studies indicate that global average climate warming during this century may even surpass the highest values in the projected Intergovernmental Panel on Climate Change global warming range of 1.4–5.8 °C” (2006, page 211). Crutzen stresses that, whereas stabilisation of atmospheric carbon dioxide requires 60–80% reductions in emissions, human additions to global carbon are actually increasing (page 212). As with many other earth scientists, he fears that rising greenhouse gas concentrations will trigger positive feedbacks—or self-reinforcing reactions—that will push global climate across a threshold into a new ‘state’ or ‘regime’. It is primarily as a means of holding off this transition long enough to effect more substantial changes that Crutzen and his colleagues seem willing to consider temporary climate engineering.

But the idea of pushing through emergency measures in the face of impending disaster elicits deep distrust from many social scientists, especially those of left-leaning political persuasions. For geographer Eric Swyngedouw (2007), the evocation of catastrophe in climate change discourses has depoliticising effects, in that it deflects attention to an event horizon that is too removed from the daily rough-and-tumble of genuine political struggle. For other critical social scientists, it is claims for the imminence of climate catastrophe that serve to short-circuit due political process, by instilling an atmosphere of crisis in which there is never enough time for proper deliberation or collective consultation. Although it has been around for some time, this mode of critique has flourished in the post-9/11 political environment.

Taking cues from theorists such as Michel Foucault and Giorgio Agamben, social thinkers have been noting the growing willingness of state authorities to suspend legally sanctioned freedoms and rights in response to perceived security threats. These tend to be perils associated with intensifying global interconnectivity—such as terrorism, emergent viruses, and other biosecurity hazards. As critical commentators attest, claims about the vulnerability of territorial collectivities are presented as a rationale for sweeping new state powers of surveillance, containment, and anticipatory intervention (Braun, 2007; Cooper, 2010).

What concerns social critics is not so much the acknowledgement of these risks, as the way they are being mobilised to make it appear as though ‘securitisation’ measures are the only viable response. As well as deflecting contestation, such securing practices, sceptics argue, often turn out to be as inflammatory as the hazards they seek to contain. This mode of critique has obvious appeal for engaging with geoenvironmental. As sociologist Melinda Cooper argues, the application of aggressive discourses of national and global securitisation to the current climatic predicament is prompting an acceptance of geoenvironmental despite the

fact that such interventions are believed to have deeply uncertain effects of their own:

“The paradox of this argument is that it calls for a strategic intervention into the atmosphere in order to pre-empt the worst effects of climate change, while acknowledging that such an intervention may itself be indistinguishable from the process of climate change—that is to say, equally unpredictable, incalculable and turbulent in its unfolding (2010, page 184).

In this way, geoengineering promises the worst of all worlds. The authorisation of climate modification under the veil of emergency is likely to override democratic procedure and undermine the nascent architectures of collective environmental governance. And catastrophic global change will be visited upon us, regardless.

But care is needed if critical orientations towards the politics of emergency are not to mirror the oppressive tone of the scenarios to which they object. As political theorist Bonnie Honig insists, declarations of a state of emergency are ambivalent acts—open to multiple readings and responses (2009, page xvii). Taking issue with the charge that grammars of emergency necessarily jeopardise ‘real politics’, she seeks out and discovers new possibilities for political renewal: “hidden resources and alternative angles of vision that might motivate action in concert in emergency settings” (page xv).

Along these lines, I suggest that geoengineering might itself be viewed as an occasion for political adventure and change—without in any way denying the tensions and risks involved. For a start, we need to be attentive to the degree of caution that accompanies nearly all serious consideration of the climate modification option—perhaps best personified in the title of climatologist Alan Robock’s paper: “20 reasons why geoengineering may be a bad idea” (2008). Included amongst Robock’s reasons, and echoed by colleagues, is the fact that geotechnical options deal only with the symptoms of climate change and leave causes unattended, the risk of technical ‘solutions’ sidelining demands for political action on greenhouse gas emissions, fears over commercialisation or military appropriation of climate modification techniques, and the likelihood that any planet-scaled intervention in the climatic system would have uneven and discriminatory impacts at regional or local levels (Robock, 2008; see also Keith, 2000).

However, such arguments are still largely a matter of physical scientists and engineers airing a kind of critical reflexivity that social scientists would quickly see as akin to their own. More provocatively, I propose that geoengineering discourse is also helping to open up new political terrain—of a kind that critical or progressive social thinkers have been shying away from for many years. As I will be explaining in the following sections, the emergent geoengineering imaginary is bringing into relief novel geologic objects of contention, most notably issues hinging around thresholds in earth systems.

Social thought’s evasion of the earth

Prompted by the climate change problematic, questions about the governance of earth systems are beginning to surface in the social sciences (see Dryzek and Stevenson, 2011; Lövbrand et al, 2009). But we need to ask why the social sciences are coming so late to the problematisation and politicisation of the geologic: a question that directs us to both recent and longstanding dispositions of social thought.

As signalled by critical discourses on global securitisation and the thematic of depoliticisation that we looked at above, there is a strong imperative in contemporary social inquiry to be deeply and consistently ‘political’. In the present postfoundational and anti-essentialist climate, the very possibility of being properly political tends to be bound up with some form of relational ontology. Whether the inspiration is the biopolitical critique of Foucault, the network analyses of Latour, or otherwise, it is assumed that a key task of politically astute analysis is to reveal how any object of concern is never simply given,

but always constituted through particular sets of practices, strategies, and apparatuses. In this way, what counts as reality at any moment can be shown to be at least potentially open to an alternative ordering or recomposition of the relational field.

While such styles of political ontology (or ontological politics) have proved fruitful in engaging with a range of human and more-than-human objects, this traction has rarely been extended to the geophysical realms. If the unsettling of preexistence or givenness is the primary gesture that opens 'reality' to political purchase, it is hardly surprising that phenomena on the scale of geologic or astronomical bodies have proved recalcitrant.

Though we might hope that geography—with its dual physical and human strands—might offer an exception, there is scant evidence that the discipline has evaded the tendencies I have sketched out. There are many and complex reasons why even the most pressing of environmental problems have yet to engender a much-anticipated fusion of a bifurcated geography. In particular, we need to consider human geography's visceral reaction against the discipline's 19th and early 20th century partiality for environmental determinisms—an investment that has come to be seen as deeply implicated in Western imperialist projects. Turning away from any style of thought that smacks of a subtending environment or earth, human geographers of 'progressive' persuasions have—over the recent decades—chosen to stress the inherently contestable or 'political' dimensions of spatial relationships. However, as David Demeritt (2009a) argues, the assumption "that politics should be 'put first'" in critical geographical approaches has discouraged sustained engagement with branches of the discipline whose priorities lie with other processes or agencies (Bryant, cited in Demeritt, 2009a, page 9). If this is the case with regard to engagement with environmental issues more generally, it is perhaps at its most pronounced in the context of larger scale earth processes. In relation to human aspects of place making, such forces introduce 'contrasting temporalities', which—as Doreen Massey puts it, "pose real problems for politics" (2005, page 356). Most often, I would suggest, these problems have been circumvented by the simple expedient of focusing attention on those aspects of materiality where a clear imprint of the human collectivities *can* be discerned—and whose very being could thus be considered 'political'. Though coming from a rather different set of imperatives, we should also keep in mind that growing pressure on human geographers who are interested in environmental processes to deliver policy-relevant findings can likewise discourage significant investment in the more intransigent forces of the earth (see Demeritt, 2009b).

It is not only disciplinary imperatives towards politicisation of varying kinds that leave contemporary critical social thought somewhat lacking in a conceptual armature for dealing with the geologic agency of humankind. There is also a more 'sociomaterial' conditioning of social science's occlusion of the earth and its dynamics. We need to consider the gradual drift away from an everyday proximity to earth and life processes over the course of our modernity, a movement in which the social sciences have been caught up. The challenge of living with variable physical environments, as anthropological accounts and local narratives indicate, has been integral to the collectivities we refer to as 'traditional' or 'premodern'. Evidence suggests that these societies have means of monitoring and anticipating variability in the physical systems upon which they rely, and ways of responding to environmental change and volatility. These responses include such strategies as temporary migration, switching biophysical resources, and active intervention in physical systems by such means as channelling water and applying fire (Adger et al, 2003; Clark 2011; 2014).

In 'modernising' social formations, however, much of the work of actively engaging with irregularity in physical systems has been displaced by the utilisation of globalised flows of resources. Early industrialising economies have been able to take advantage of vast matter–energy subsidies from colonised lands as well as from subsurface deposits of

fossilised hydrocarbons. This is reflected in the fact that in both the practical governance of these societies and the social scientific reflection upon the modern life, the issue of how to live with the variability of earth systems has rarely taken a high priority. Outside of a few specialised professions, Michel Serres (1995) notes, close attention to the shifting patterns of weather and other physical forces has waned. At the same time, ‘traditional’ strategies for accommodating to changeable earth-life processes have suffered from disruption and attenuation—as the social formations in question have been increasingly drawn into globalising economies.

For complex historical and political reasons, then, the social sciences have an inheritance of disinterest in the geologic *per se*. This leaves something of a void when it comes to addressing recent scientific claims that humankind has itself inadvertently become a geologic force. Likewise, it leaves social scientists with few reference points for engaging with questions of intentional human geoclimatic agency.

All of which means that any assumption that the social sciences are predisposed to make a decisive contribution to geoengineering debates needs to be scrutinised. But I want to suggest that a clearer sense of social science’s shortfalls might serve to sensitise us to what is valuable and timely in the geoengineering’s confrontation with the forces and dynamics of the geologic. To this end, we turn now to the content and contours of the issues that the climate modification debate is bringing into relief.

Territory and strata

We have seen that concerns over security threats in a globalising world have engendered new strategies for protecting territorial collectivities against undesirable incursions of lively beings—both human and nonhuman. Geographers, it might be claimed, are beginning to bring some ‘depth’ to discussions about territorial processes, by drawing attention to the vertical and volumetric dimensions of territory in the political landscapes of modernity (see Braun, 2000; Elden, 2013). But it is early days. The geoengineering debate, together with the more encompassing problematic of climate change I would argue, goes further, raising fundamental questions about the very forces that generate, subtend, and sometimes destabilise territorialised political formations.

As we have seen, geoengineering discourse foregrounds the potentiality of earth systems to pass over critical transition points to whole new systemic conditions or states. It is such moments of passage through thresholds (popularised as ‘tipping points’ in the lexicon of climate change) that geoscientists use to distinguish different periods or epochs in the earth’s history. And it is major shifts between states or ‘regimes’ of earth systems that define the multiple strata that can be distinguished in the structure of the planet’s crust. In attending to questions of whether or not, by what means, to what degree, and with whose consent purposive intervention in climatic systems might be initiated, geoengineering deliberations pivot around such critical points in earth systems.

Geoengineering is not alone in this regard. Other issues associated with climate change, such as environmental migration, threats to coastal settlements and infrastructure, and the recent ‘rush’ for access to productive land in distant regions also have much to do with the risk of crossing boundaries in earth systems, as indeed does the more encompassing discussion about the coming of a new human-induced geologic epoch—termed the ‘Anthropocene’ (Crutzen and Stoermer, 2000). The concern with securing social life against incursive biological threats is also already partially oriented towards ‘emergent’ events—which is to say, threshold points in ecological systems.

But arguably, it is the geoengineering field that is most directly and *practically* geared towards the prospect of transgressing thresholds in earth systems. Geotechnics and related engagements with dynamical earth processes, as we have seen, are oriented toward changes of

state or ‘regime shifts’ in complex physical systems. In this way, the boundaries or thresholds of earth systems are being rendered politically problematic, analogous to the ways that more ‘conventional’ political issues come into sharp relief at the borders of nation-states or other territorial units. To put it another way, we might say that an emergent political concern with *strata*—the dynamic compositional layerings of the earth—is beginning to supplement the more familiar political agendas defined by territory.

The possibility raised by geoengineering debates—and by the Anthropocene thesis more generally—is that the critical thresholds or boundaries that define *strata* may turn out to be at least as important as those which delineate *territories*. Of course, it is not simply a question of replacing the politics of territory with a politics of strata, but a matter of exploring the multiple ways in which the dynamical properties of strata overlap, cut across, or collide with territorial processes. If not in these precise terms, such issues already feature in geoengineering deliberations. Discussants have pondered the question of the differential impact of various planet-scaled engineering options on the inhabitants of different nation-states or regions. They have confronted the possibility that single nations might embark upon climate modification programmes without the consent of the global community, as well as considering how the multiplex world of political states might convene to govern geoengineering research and development. And they have begun to contemplate the mammoth task of drawing the entire global populace into some kind of participation in decisions over geoengineering options (see Corner and Pidgeon, 2010; Robock, 2008)

What I am suggesting then, is that geoengineering debates are already in the process of reconfiguring political agendas around the shifting composition of the earth’s strata, and around the tension between the deep temporal dynamics of strata and the more superficial territorial divisions of the earth’s surface. But a politics of strata is not simply an addition or amendment to the prevailing politics of territory. Thinking and working through strata, I would insist, have very different implications for politics than engaging with territory, and it is these differences or specificities that I turn to in my concluding remarks.

Geologic politics for a stratified planet

Earlier, I suggested that earth processes have proven resistant to prevailing modes of ‘political ontology’ on account of the difficulty in imagining them as being composed or enacted differently. Now, it may seem as though the possibility of geoengineering overcomes any conceived limit to the scope of ontological politics by showing that even the elemental composition of our planet is now open to remaking, and is in this way—at least in theory—amenable to the decisions of the polity. But such a reading, I would argue, is too simplistic.

If there is one thing we need to take from an encounter with geoengineering debates, it is that the earth in its entirety cannot be straightforwardly rendered into an object of political contention. While it may well be that the *territories* over which different human groupings struggle are themselves socially constructed—and thus in a real sense always already politicised—the same cannot be said of *strata*.

Strata are characterised by subtending relationships, in the sense that earlier or older strata are the condition of possibility of later strata. It takes an already-composed planetary body to support the emergence of biological life, just as a well-established stratum of living things is the condition of existence of our own species. As philosophers Jacques Deleuze and Félix Guattari explain, it is possible for strata to enfold each other or otherwise complicate any strict order of succession (1987, pages 335–336). Nonetheless, the subtending relationship between earlier and later strata imposes profound limits on their capacity for recomposition by human action or any other form of agency. So while human agents can tap into buried strata—the exhuming of fossilised hydrocarbons being a decisive case—there is an important sense in which strata composed in the past are not simply ours to ‘recompose’. That is, we cannot

expect the conditions out of which humans emerged to fully submit to our reconstruction or reordering, no matter how careful and how collective decision-making processes have been (Clark, 2011, pages 50–54).

With regard to geoengineering, it is important for social thinkers to keep firmly in mind that even advocates of the most audacious proposals to intervene in the earth's climate are aware that they are only 'tweaking' a vast, massively complex system. They know full well that any nudging of global climate into or away from a threshold is only possible because the alternative regime is one of the possible or virtual states that inhere in the extant earth system. In whatever form it might be imagined or applied, then, geoengineering is not a total remaking of the earth, not the final seal on the 'end of nature'. It can only ever be a negotiation between the forces that humans can conceivably impact upon and those that remain—provisionally or permanently—beyond their practical reach.

I have been arguing that geoengineering is at the forefront of issues that are extending the scope of the political into new geological or 'stratal' domains. But in the very process, I want to insist, politics confronts its own limits. It comes up against what philosopher Claire Colebrook refers to as the "monstrously impolitic" (2011, page 11) or what fellow philosopher Elizabeth Grosz describes as "cosmological imponderables" (2008, page 23) — elemental cosmic and terrestrial forces that surpass all measure of the human. In this sense, the incitement of geotechnics—and of 'geologic politics' more generally—is to bring into relief the demanding and fraught nature of the juncture between that which is potentially political and that which exceeds the grasp of politics, between the narrow province of the polity and the vast dominions of the inhuman.

This means that, in order to make a positive contribution to geoengineering and other geopolitical issues, key strands of social science may need to reconsider their investment in ontopolitical thinking. If the desire for political domains that map onto 'existence' or 'reality' with no remainder has been responsible for the occlusion of the geologic and cosmologic dimensions of being, the same imaginaries are unlikely to open the way to the geologic politics that the current planetary predicament calls for. It is of course necessary for social science to interrogate the production of natural scientific knowledge. But the issues raised in the geoengineering debate thus far suggest that there is also an urgent need for the social sciences to offer their commitment and support to those geophysical truth claims that (provisionally) pass the test.

Moreover, if social sciences are to move beyond defensive and reactive responses to geoengineering, they will need to move their contributions 'upstream' to the framing of scientific and technoscientific inquiry. This means that social scientists must learn to think creatively and speculatively around interventions in earth systems—as well as engaging critically. They must be willing to reengage, in new ways, with a long human history of active, hands-on intervention in valued physical systems (Clark, 2014). For human geographers especially, I would argue, geoengineering offers an incitement to return to the deep temporalities and elemental forcefulness of the earth. It is one of number of contemporary issues that prompt us to imagine a new kind of geologic politics in which identity, citizenship, and governance are construed not just in terms of the territorial subdivisions of our planet's surface, but in the relation to a dynamic and stratified earth.

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