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# "There is No Planet B": Frame Disputes within the Environmental Movement over Geoengineering

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“There is No Planet B”:

Frame Disputes within the Environmental Movement over Geoengineering

by

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A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
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College of Arts & Sciences  
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## DEDICATION

For my mother.

## ACKNOWLEDGMENTS

Many people deserve credit for helping me complete the research presented in the following pages. My family and friends have provided crucial support during my graduate studies, patiently listening to my complaints when things were not going well and cheering me along when they were. I could not have dedicated an adequate amount of time and effort to this project without the knowledge that they were behind me every step of the way.

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## ABSTRACT

This dissertation examines frame disputes within the environmental movement over geoengineering proposals. Among other core framing tasks, social movement organizations must evaluate solutions and strategies for the social problems they seek to address. These framings are frequently disputed by those within the movement. Recent controversies regarding a set of climate intervention proposals commonly known as geoengineering offer the opportunity to document the ongoing construction of competing visions of environmental sustainability. The nascent quality of these proposals generate dissonant framings – episodes where organizations within the environmental movement exhibit disagreement about one or more core framing tasks – a situation Goffman referred to as a “frame dispute.” I present the results of a frame analysis of websites, blog posts, and other online discourse produced between 2005 and 2015 by 16 environmental movement organizations about geoengineering. The findings illustrate the influence of frame disputes on the realization of movement goals and the dynamic interdependence of movement framing activities. For example, increased attention to frame resonance did not attenuate prognostic frame disputes during the period analyzed. Analyzing frame disputes generates useful insights for studies seeking to analyze collective identity construction processes and dynamics within and between social movement organizations.

## CHAPTER ONE: INTRODUCTION

This dissertation analyzes frame disputes (Benford 1993) among environmental movement organizations (EMOs) over “geoengineering” proposals. It has long been understood that framing activities (Snow, Rochford, Worden, and Benford 1986) that enhance collective identity (Taylor and Whittier 1992; Melucci 1995) are a crucial part of mobilization. While engaged in framing activities, however, EMOs frequently disagree both internally and amongst each other over their representational repertoire. EMO-generated discourse about geoengineering – technological schemes designed to blunt the impending negative effects of global warming – offers the opportunity to interrogate the utility of the concept of “frame disputes” and its capacity to contribute to our understanding of collective identity construction processes. The question guiding this inductive exploration is: How do EMOs differentially represent geoengineering online?

Contentious interactions in EMO-produced blogs and other online forums happen when all of the environmental movement actors involved cannot be brought into the same frame. Goffman called this type of interaction a frame dispute (Goffman 1974:322). Sociological research has repeatedly shown the central importance of framing

in the organization of activists' experiences. But with a few exceptions, research on frame disputes within the environmental movement remains relatively scant. Most research on contentious framing focuses on the interactions of EMOs with antagonists and other outsider publics such as the media. While much has been gained by these studies of "frame contests," the present study argues that studying disputes among organizations *within* a movement can yield important insights into collective identity construction processes and dynamics.

The climate change crisis has prompted a wide range of responses from a variety of actors. When the discussion turns to solutions to this crisis, differential framings are likewise the norm. A great deal of time, effort, and resources are spent constructing the ideas and language people use to discuss carbon dioxide, the effect that too much of it in the atmosphere can have for our environment, and what should be done about it. To date, most EMO framing efforts surrounding carbon dioxide have been aimed at lowering the amount that we emit into the atmosphere. However, geoengineering proposals represent a fundamental reorientation toward carbon dioxide for some EMOs. If it is possible to capture, sequester, bury, or scrub carbon dioxide emissions, if there is a viable technological solution to climate change, then it seems quite possible that incentives for mobilizations around reducing carbon dioxide emissions may be themselves reduced.

Public discourse surrounding geoengineering increased markedly during the 2005-2015 study period as these once-obscure proposals gained increased attention from

scientists, policymakers, and the media. Geoengineering-related framing activities also increased during this time, and frame disputes erupted frequently within the environmental movement over how geoengineering ought to be represented. Through a meso-level analysis of online geoengineering discourse, the research presented here shows how EMOs attempt to construct resonant framings under nascent ontological conditions.

### *Contribution to the Literature and Chapter Organization*

This study contributes to sociological research in many ways. First, by examining the framing activities of 16 EMOs from 2005 through 2015, it offers a chronological overview of the development of these organizations' understandings of a controversial issue, and the occasional rancor that ensues as the various collective identities that comprise the movement interact with each other.

Second, the study problematizes the construction of "resonant" frames by focusing on evidence of dissonance. Geoengineering proposals represent many things to the EMOs in this study. These proposals are, at the very least, new to most people. The nascent quality of geoengineering proposals allows for an examination of the kinds of emergent contention that surround controversial environmental technologies, and ultimately shows how intergroup conflicts like frame disputes can be both beneficial and detrimental to organizations within the movement.

Third, this dissertation offers an empirical account of the recursive relationship between elite and rank-and-file movement actors as they try to make sense of geoengineering proposals through their interactions online. As movement elites trot out their newly-formed frames about geoengineering, they are confronted by rank-and-file actors who may criticize, offer alternatives, or otherwise dispute the content or manner of the framing activity.

Fourth, this research shows how the study of online interactions can enrich certain social movement studies, allowing social scientists to observe the kind of interactions that are traditionally thought to require a level of access that could only be afforded by in-depth participant observation. Finally, the study presented here elaborates on the interplay between frame disputes and collective identity, arguing that empirical research on the former enhances our conceptual understanding of the latter.

Chapter two outlines the theoretical perspective guiding the research. Previous investigations that use concepts such as frames, frame disputes, and collective identity are reviewed. Particular attention is paid to how these concepts have been applied to the study of the environmental movement. This review of selected literature also provides justifications for a number of different methodological considerations.

These methodological considerations are discussed at length in chapter three. The chapter contains an overview of the data used to analyze the online framings of 16 EMOs<sup>1</sup>, the analytic techniques used to characterize their framings of geoengineering

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<sup>1</sup> See Appendix A for a brief overview of the organizations.

proposals, and justifications for these procedures. Blog posts, newsletters, and other online publications relating to geoengineering were gathered from EMOs representing a wide array of discursive perspectives within the environmental movement. Their geoengineering-related discourse exhibits the diversity of opinions about how geoengineering should be regarded and discussed.

Chapter four consists of an empirical analysis of prognostic frame disputes within the environmental movement. These disagreements over geoengineering as a potential solution were evidenced by highly differentiated framings, especially during the last half of the study period. Prognostic frame disputes continued to increase through the end of the study period as EMOs refined their understandings of these controversial proposals. Their highly nuanced framings of geoengineering provide evidence of the wide-ranging collective identities that exist within the environmental movement. Further, the analysis shows how this discursive diversity allows those who view geoengineering as a dangerous distraction as well as those who view it as intriguing or inevitable to each call themselves environmentalists.

The fifth chapter offers an analysis of frame resonance disputes. Like the prognostic framing disputes analyzed in chapter four, disputes over frame resonance were more frequent in the later years of the study period. Notable episodes of framing conflict and control are analyzed as EMOs disagreed over how geoengineering proposals ought to be represented to various audiences. Over time certain EMOs remained steadfast in their framings, while others keyed on the frames of allies to

reframe geoengineering from a risk to a responsibility. These frame resonance disputes also tended to produce more interactions between EMOs and their online readership than did prognostic frame disputes.

Much like the prognostic frame disputes analyzed in chapter four, frame resonance disputes serve as another means by which researchers can observe relatively understudied collective identity construction dynamics. Paying attention to these contentious interactions offers a productive alternative route to the study of collective identity construction processes, and provides a window into the dialectics of negotiated solidarity within the movement. These dynamics are discussed in chapter six.

The final chapter begins with a summary and discussion of the relevant findings and contributions this research provides, especially with regard to frame disputes and collective identity construction in social movement organizations. It also takes note of the methodological limitations of the present study, offering suggestive remedies where possible. The chapter concludes by identifying a number of areas of future research that would improve our understanding of frame disputes, collective identity, and environmental movement organizations, and how these future projects might contribute to our understanding of broader social processes.

**CHAPTER TWO:**

**THE ILLUSION OF UNANIMITY: FRAME DISPUTES WITHIN THE  
ENVIRONMENTAL MOVEMENT**

My dissertation is informed by selected concepts rooted in the symbolic interactionist, social constructionist, and dramaturgical traditions, which have been applied frequently in sociological research.

In sociology, the theoretical development of symbolic interactionism is traced to the pioneering work of Mead (1934) and Blumer (1954) who argued that people act on the meanings that things have for them, that these meanings come from interaction, and that these meanings are modified through interpretive processes (Blumer 1969:2). The assumptions and orientations of social constructionism are often credited to Berger and Luckmann (1966), who argued that conceptions of reality result from the institutionalized interactions of individuals and groups. Social constructionist research considers seriously the oft-observed gap between so-called “objective reality” and its various representations.

For example, ideally policy proposals are designed and implemented using unbiased information and intentions. In practice, however, both policy design and



implementation are influenced by discursive representations of social problems (Spector and Kitsuse 1973) that produce different effects among individuals and groups. The “target population” of a policy, according to the constructionist, might experience advantage or disadvantage as a result of policy designs (Schneider and Ingram 1993). Indeed, target populations are themselves discursively constituted and evaluated in terms of, for example, “deservedness” or “entitlement” (Ingram and Schneider 2005).

Social constructionist research likewise emphasizes the role of problem construction in the development of social movements. In social movement scholarship, social problems are articulated as grievances through an interpretive process known as “framing.” Frames are used to align individuals with social movements and facilitate participation and mobilization for collective action. Building on concepts found in Goffman’s (1974) *Frame Analysis*, these frame alignment processes include frame bridging, frame amplification, frame extension, and frame transformation (Snow et al. 1986). According to its primary expositors, framing refers to:

...an active, processual phenomenon that implies agency and contention at the level of reality construction. It is active in the sense that something is being done, and processual in the sense of a dynamic, evolving process. It entails agency in the sense that what is evolving is the work of social movement organizations or movement activists. And it is contentious in the sense that it involves the generation of interpretive frames that not only differ from existing ones but that may also challenge them. The resultant products of this framing activity are referred to as “collective action frames.” (Benford and Snow 2000:614)

Social movements like the environmental movement produce discourses about public issues, including their sources and solutions. They frame perceived grievances and a course of ameliorative action using a distinctive discursive vocabulary that can be identified through observation and analysis. Framing thus involves the development and maintenance of diagnostic frames, prognostic frames, and frame resonance. Diagnostic frames “attribute blame for some problematic condition by identifying culpable agents, be they individuals or collective processes or structures,” while prognostic frames provide “both a general line of action for ameliorating the problem and the assignment of responsibility for carrying out that action” (Snow and Benford 1992:137). Frame resonance refers to the degree to which a social movement has the potential to persuade the uncommitted to commit to the cause. As they are interpretive matters, all framings are subject to contention.

The “illusion of unanimity<sup>2</sup>” (Turner and Killian 1972) that comes from lumping like-minded individuals into groups, and subsequently lumping those groups into a super-group obscures how a movement accomplishes its goals. To put it in terms of framing, closer attention needs to be paid to the ways that a social movement maintains solidarity despite the confusion that occasionally arises through the use of multiple, competing frames. In this sense, characterizing the broad array of perspectives that find

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<sup>2</sup> Turner and Killian (1972) used this phrase to describe the perception of complete unity that is experienced when observing people engaged in collective behavior:

...a social movement depends upon the contributions of many kinds of people, acting in varied ways, for diverse reasons. Also [...] it must have some central norm that supplies a ready-made explanation and justification for these diverse elements. The emergent norm underlies the appearance of homogeneity that permits members and society to see the movement as a unit. (259)

shelter under the canopy of environmentalism as any one thing probably obscures more than it illuminates.

Geoengineering proposals could portend a wholesale transformation of the climate change frame. At the risk of committing the sin of oversimplification that I have just advocated against, I think it is safe to say that the environmental movement casts carbon dioxide emissions as the problem, our fossil-fuel driven economy as the culprit, and an immediate shift away from fossil fuels as the way to stop emissions from rendering our planet unlivable for our species. We might expect the environmental movement to react in at least three ways to geoengineering proposals, since support for these schemes would essentially entail the transformation of this frame. Activists could reject the transformation and remain steadfast in the current frame, accept the transformation and abandon the previous frame, or combine elements of the old and the new through the process of frame extension (Trumpy 2014:177).

What might these alternatives look like? Rejecting the frame transformation would be the easiest eventuality to envision. Geoengineering proposals would be framed as a scheme to continue our current fossil fuel extraction and consumption practices, slowing the transition to renewable sources of energy. Accepting the frame transformation and abandoning the current climate change frame would be noteworthy indeed, since such a change would entail a wholesale reversal of decades of framing activity. This could manifest as a sort of resigned fatalism (“it’s too late”), or as the enthusiastic embrace of a miraculous environmental technology, or something in

between. Frame extension might entail an *à la carte* approach, where the usual push for emissions reductions is combined with support for geoengineering research so as to keep all options on the table, so to speak.

### *Frame Disputes*

Within social movements, “organizations devote considerable time to constructing particular versions of reality, developing and espousing alternative visions of that reality, attempting to affect various audiences’ interpretations, and managing the impressions people form about their movement” (Benford 1993:678). Since these are interpretive matters, they are subject to negotiation and contention.

Social movements like the environmental movement are not discursive monoliths, and it should come as no surprise that social movement participants and their organizations frequently disagree as to which kinds of frames should be deployed. These internal disagreements have been conceptualized as “frame disputes” when they occur within a social movement organization (SMO) (intraorganizational frame disputes) or between two or more SMOs within the same movement (interorganizational frame disputes) (Benford 1993). Three major types of frame disputes might erupt over disagreements about:

- problem identification and the attribution of blame; known as “diagnostic frame disputes,”

- ameliorative solutions, strategies, and tactics; referred to as “prognostic frame disputes,” or,
- movement portrayals of grievances and solutions; called “frame resonance disputes” or *framing* disputes.

Also important is the distinction between frame disputes and framing “contests.” For the purposes of this dissertation, the concepts of frame disputes and framing contests are distinguished by the participants involved in the fray. While frame disputes take place within a movement, framing contests may involve social movement actors, but also include actors who are external to the movement – for example, countermovement actors (Marx 1979; Mottl 1980), target populations, or the media (Ryan 1991; Benford 2013). Framing contests occur quite frequently, and have often been the subject of study in research on the environmental movement.

A few recent studies of framing contests deserve mention. For example, Dunlap and his colleagues published a series of articles documenting the efforts of the conservative movement to challenge the scientific basis for collective action concerning climate change (McCright and Dunlap 2000; McCright and Dunlap 2003; Jacques, Dunlap and Freeman 2008; McCright and Dunlap 2010). Taken together, their studies add to our growing understanding of “manufactured uncertainty.” Oreskes and Conway (2011) document this strategy extensively across a number of controversial issues over time, showing how scientific “debate” is fostered through the financial

support of vested interests – creating confusion about the existence of scientific consensus and polarization amongst the public.

Brulle’s (2014) research on climate change countermovement funding sources uses IRS data to detail the financial interests supporting their framing activities. As it turns out, an overwhelming majority of support for the climate change countermovement comes from conservative foundations, and these funding sources are increasingly being concealed through the use of donor-directed philanthropies. Tellingly, Hoffman’s (2011) research shows that environmental countermovement actors most frequently disagree with the diagnostic frames offered by the environmental movement. The overwhelming majority of their framing activity focuses on sowing seeds of doubt about environmentalists’ construction of the issue. However, within the environmental movement, he found that actors deployed diagnoses, prognoses, and resonance strategies.

In each of the studies above, discursive disagreements center on conflicting interpretations regarding what is going on with the environment. These framing contests rarely extend beyond disagreements over problem identification and blame attribution. It is difficult at best under these circumstances to agree on a prognosis for action since one or more parties disavow the need for amelioration in the first place. The focus on diagnosis prevents parties from broaching the subject of solutions in any meaningful way. This is not to say that that framing contests over environmental issues

do not extend past diagnostic framing; they certainly may under certain circumstances<sup>3</sup>. But in most studies of framing contests, it seems that actors involved are largely “talking past each other” (Hoffman 2011:5).

Less well understood are the ways that frame disputes influence collective identity construction processes within social movements. The literature on frame disputes in social movements starts with Benford’s (1993) research on the nuclear disarmament movement. Benford (1993) begins by quoting Goffman’s (1974) observation that:

...an appreciable period can elapse when there is no immediate potential agreement, when, in fact, there is no way in theory to bring everyone involved into the same frame. Under these circumstances one can expect that the parties with opposing versions of events may openly dispute with each other over how to define what has been or is happening. A frame dispute results. (322)

The general concept of frame disputes, as described by Goffman, encompasses all disagreements between parties with opposing versions of events, including frame contests. While frame disputes as conceived by Benford occur in a constrained cultural context (i.e., within social movements), the outcomes of these disputes may be consequential for debate in the wider cultural context. Indeed, the frame resonance disputes that Benford (1993) describes center on disagreements over “the presentation

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<sup>3</sup> For example Vincent and Shriver (2009) examine three groups of residents who largely shared the same diagnostic frames about a controversial Superfund site, but nevertheless had divergent prognostic frames, of which they note that: “Each group attempted to discredit their opponents, accusing them of self-interested motives and asserting they are only concerned with how they can benefit from government actions rather than the overall public good” (174).

of movement self” to the society at large (686). As he explains, frames must first survive the furnace of intramovement infighting before they can be thrown into the fire of cultural conflict:

...what is at issue for the activists and their organizations is how to win the wider frame dispute [i.e. frame contest] and thus emerge victorious over the movement’s opponents...The movement’s chances of winning this struggle, though, may depend in part on the outcomes of the intramovement debates and conflict. (Benford 1993:680)

Thus, frame disputes and framing contests together contribute to a comprehensive understanding of contentious framing activity. Movements must negotiate diagnoses, prognoses, and resonance strategies that help to elevate their framings over those of their opponents. Thus, disagreements among movement allies over these framing tasks are thought to serve as a sort of crucible within which activists negotiate over how best to represent the movement in the wider public debate. The literature on frame disputes within the environmental movement, while relatively scant (Lichterman 1995; Krogman 1996; Gray 2003; King 2008; Resnick 2009; Walker 2009; Wahlström, Wennerhag and Rootes 2013), offers some intriguing insights into the processes and dynamics of collective identity construction.

#### *Frame Disputes within the Environmental Movement*

In line with the framing tasks outlined in previous studies of frame alignment, Benford’s (1993) research differentiates between three kinds of intramovement frame



dispute “disagreements over what is [diagnostic], over what ought to be [prognostic], and over how to represent a movement’s versions and visions of reality [frame resonance]” (679). He also distinguishes intraorganizational frame disputes from interorganizational frame disputes. Of the latter, he asserts that “coalitions of movement organizations are particularly conducive to frame disputes because they are comprised of activists from a variety of SMOs, each having its own version of reality, agenda, and views regarding the ways in which the movement should go about the business of recruitment, activation, and contention for power” (680-681). This finding seems to be supported by much of the subsequent research on frame disputes within the environmental movement.

For example, Lichterman (1995) observed problems when the two environmental movement organizations he studied attempted to build a coalition. His research focused primarily on the U.S. Greens and their community practices, and the difficulties they encountered in their attempts to build an alliance with a culturally diverse anti-toxics organization. He found that the Greens “constructed a *personalized* movement community that accented individual responsibility and individual voice within a collective effort” [emphasis in original] (Lichterman 1995:514). This created difficulty when they attempted to align their grievances with “a largely African American group based in a small, industrial, predominantly minority-populated city” (Lichterman 1995:519). The Greens’ longstanding commitment to multicultural values had led them to seek connections with like-minded groups with a culturally diverse membership. The

two organizations had different ideas about community, however, and this difference ultimately prevented coalition formation.

In sum, Lichterman's (1995) research "very tentatively suggests one of the reasons why new left, radical women's, and anti-nuclear movement organizations have been characterized by a preponderance of highly educated, middle-class whites despite some well-meaning attempts by these activists...to reach out to people of color from varied socioeconomic backgrounds" (529). Lichterman's research is unique in that he explicitly examines multicultural coalition building, finding that the personalized movement communities of middle-class whites may not match well with the more communal environmental justice ethos.

Among allies, some things are more easily agreed upon than others. For example, one could reasonably expect that diagnostic frame disputes occur with less frequency within movements than disputes over other framing tasks. After all, problem identification and blame attribution are more fundamental to movement formation and cohesion than are particular goals and strategies<sup>4</sup>. What this means is that for the environmental movement, disputes about the influence of carbon dioxide emissions on the atmosphere and whether or not human beings bear responsibility for climate

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<sup>4</sup> However, Futrell (2003) found that the anti-toxics activists he studied initially experienced an "information haze" that made it hard for them to attend to problem identification and blame attribution, let alone develop solutions:

This case suggests particular difficulties and constraints associated with developing a solid framing of situations involving a high degree of technical and scientific rhetoric. Expert authority may powerfully shape the contours of framing activities. The language of science and expertise can stall efforts of non-experts to understand what is going on. Lay citizens have to place a great degree of faith in the authority and judgments of experts. It is common for experts to encourage this. (380)

change are relatively rare. More common are disputes over what is to be done about the situation, and how the situation should be presented to relevant audiences.

Prognostic frame disputes, like frame resonance disputes, are a common feature within the environmental movement. Wahlström et al. (2013) surveyed environmental protestors in Copenhagen, Brussels, and London during the 2009 UN Climate Change Conference in order to determine how and why the collective action frames employed by demonstrators varied. The authors were particularly interested in three distinct forms of prognostic frames: “action at the system level and through increased global justice (reflecting the emergent climate justice frame); individual action (either reformist or the ‘life politics’ associated with ‘new’ social movements); [and] policy changes within existing political systems (reformist)” (Wahlström et al. 2013:102). Responses to the question “What should be done to address the issue [climate change/global warming]?” were coded inductively and resulted in six distinct frames: “system change,” “global justice,” “change individual behavior/raise awareness,” “technological change/investments,” “legislation/policy change,” and “change industry/production” (Wahlström et al. 2013:107-109).

Descriptive analyses revealed that protestors in Brussels favored “changing individual attitudes and behavior,” while the Copenhagen and London demonstrators advocated legislative and policy changes over individual behavioral changes. What was most puzzling to the authors was the finding that global justice and system change framings were infrequently invoked by the individuals they surveyed. They emphasize

differences between the frames of protestors and ostensibly-aligned SMOs in their final comment:

Our analysis underlines that rank-and-file participants in a movement do not necessarily frame political solutions to a problem as do its movement intellectuals or the SMOs to which they belong. When studying mobilizations claiming to express the will of the many, we need to distinguish the framings of SMOs from those of activists and of participants with no organizational affiliation. ...In short, announcements of the birth in 2009 of a transnational climate justice movement appear premature. At best, if it is a movement, it is one better embedded among organizations and movement intellectuals than among rank-and-file activists. (Wahlström et al. 2013:119-120)

Wahlström et al. (2013) offer a new take on the analysis of framing in social movements by juxtaposing individual beliefs with organizational beliefs, reiterating the importance of ongoing frame alignment efforts and the difficulty inherent in bringing “everyone involved into the same frame.”

In contrast to Wahlström et al. (2013), Walker (2009) argues “that environmental justice has become a far-reaching, mobile and evolving frame for understanding and action on socio-environmental concerns, subject to necessary but sometimes problematic processes of recontextualization” (356). After reviewing research on collective action framing, Walker gives an account of the emergence of the environmental justice frame in the U.S. and its evolution along seven dimensions (Walker 2009:358-360). The strength of the environmental justice frame, the author argues, can be seen in its recent “horizontal” and “vertical” extensions.

Horizontal extensions are promoted through “deliberate transnational networking between environmental justice activist groups;” but the author is also interested in how this frame “becomes contextualised in its new cultural and political setting” (Walker 2009:361-362). Walker observed differences in the horizontal diffusion of the environmental justice frame. For example, in the UK this frame was often employed using the rhetoric of class struggle since civil rights issues and infrastructures are relatively minor in comparison to the U.S. This use of class-based environmental rhetoric also seemed to dovetail with ascendant Labour Party political concerns. In South Africa, the horizontal diffusion and adoption of the environmental justice frame proceeded along rhetorical lines that are familiar to Americans: “...the connections between the civil rights movement in the USA and anti-apartheid struggles in South Africa meant that the discourse of environmental racism resonated strongly in a country where the racialization of space had been institutionally organized and maintained through state power” (Walker 2009:367).

Early in the article, Walker (2009) notes that “the environmental justice frame is not singular, but rather flexible and dynamic, open to reconstruction as it moves both in space and time” (369). This may be the reason that Wahlström et al. (2013) found it somewhat difficult to identify environmental justice framings in rank-and-file protesters. This difficulty led them to be skeptical about the international diffusion of the frame suggested by Walker (2009) and others, who argued that environmental

justice is “becoming an international master frame that...does not appear to require a particular political or economic context in which to flourish” (374).

The findings of Wahlström et al. (2013) revealed a disjuncture between the framings of protest organizers, who pushed the emergent climate justice frame with its focus on systemic change, and activists on the ground, who largely favored individual-level environmental efforts. Frame disputes frequently seem to occur as a result of these kinds of tensions between radical and reformist visions of change<sup>5</sup>. The coalition of anti-nuclear organizations Benford analyzed consisted of three subgroup factions. The radical SMOs within the coalition saw the nuclear threat as “but a symptom of global systemic problems” and “called for fundamental structural changes” that addressed the interrelated social problems of “poverty, oppression, militarization, and environmental misuse” (Benford 1993:681). Moderate anti-nuclear SMOs “tended to define the problem in narrow terms focusing only on the nuclear threat, a problem they attributed primarily to technological developments” and advocated “a series of minor foreign policy changes, budget reductions, and international treaties” (Benford 1993:682). Liberal SMOs were an amalgamation of the radical and moderate factions that “sought

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<sup>5</sup> Benford (1993) frequently found “disputes across ideological wings” (96% of the disputes were between factions, as opposed to within them) and further, that radicals most often participated in these disputes (they were involved in 78.4% of the coded frame disputes) (685). Diagnostic disputes were least common (27.5%), whereas prognostic (35.3%) and frame resonance (37.3%) disputes were more frequent (Benford 1993:686). Thus, diagnostic, prognostic, and frame resonance disputes were found to be “fairly evenly distributed<sup>5</sup>,” though the radical faction’s disproportionate participation in frame resonance disputes skewed the relative frequency of these types of disputes (Benford 1993:685-686). Though they would likely prefer otherwise, movement activists know that people outside the movement tend to lump actors from various factions together. Frame resonance disputes are common within movements because “...to some extent, each SMO has a stake in the framing activity of every other group representing the movement.” (Benford 1993:698)

common ground between the movement's extremes" (Benford 1993:682). Similar to the radical SMOs, the liberal coalitions argued for structural reforms that would address the nuclear threat and various interrelated social issues, though these reforms were not as far-reaching. And like the moderate SMOs, "liberals were less willing to use strident rhetoric and confrontational tactics than were the radicals" (Benford 1993:682).

King (2008) notes that the factionalization resulting from frame disputes does not necessarily portend disaster for movement organizations. The Sierra Club factions that split over the issue of immigration exhibited striking similarities to the factions Benford examined:

...Benford (1993) found that disputes were more common among the movement's most moderate and most radical groups than between other factions. ...A similar type of split occurred among some of the participants in the Sierra Club debate, whose disagreement derived from ideological clashes and whose theories of society differed fundamentally. Those in the social/environmental justice camp, like the progressives in Benford's study, preferred to focus on interconnection—in this case especially between inequalities and environment—and could not countenance a policy with a single-issue focus on immigration, which ran counter to their understanding of environmentalism. (King 2008:56)

King (2008) found that the unique structure of the Sierra Club allowed it to endure and thrive during this decades-long intramural conflict over immigration policy. Factions were able to work toward other organizational goals despite the

dispute. In some cases it appears that frame disputes, even those of extremely long duration, do not necessarily produce problems for movement organizations.

Research on frame resonance disputes is extended by Resnick (2009), who illustrates the positive outcomes of these struggles for transnational environmental movements. Substantively, her study examined the repatriation of ethnic minorities to the Central Kalahari Game Reserve (CKGR) in Botswana. The government of Botswana removed these minorities from land that had previously been set aside for them, prompting outrage and framing activity from concerned SMOs. One UK-based organization framed the problem as “the privileging of the government’s greed over the rights of its citizens” since the land in question was rumored to be rich in diamond deposits (Resnick 2009:63). Local movement organizations, however, “rejected that diamonds were behind the removals and instead framed the CKGR controversy around the issue of rights and ethnic marginalization” (Resnick 2009:64).

Social conflicts like frame disputes may produce positive or negative outcomes for social movements, and Benford found that both kinds of outcomes resulted from the interpretive struggles he observed:

Intramural conflicts are detrimental and facilitative of movements and their SMOs. In the case of frame disputes, they affected the disarmament movement in a dialectical fashion. Conflicts over interpretive issues (1) led to the demobilization of some SMOs but promoted the mobilization of others, (2) depleted resources and diminished returns but resulted in the concentration of resources and enhanced the movement’s efficiency, (3) provoked factionalism but encouraged cohesiveness, and (4) stimulated a division of



interpretive labor but created voids in the performance of specific interpretive tasks.  
(Benford 1993:694)

Resnick's (2009) review of the literature on frame disputes in transnational movements suggested that such disagreements "are both more common as well as more harmful for transnational than for domestic mobilization" (56). While I do not take issue with the author's characterization of the way that frame disputes are depicted in much of the social movement scholarship<sup>6</sup>, Benford's (1993:694) original conceptualization of frame disputes elucidates different conditions under which frame disputes might benefit a movement. This oversight appears to be the reason that Resnick was surprised to find that frame resonance disputes increased the effectiveness of the transnational movement she studied:

Rifts over how claims are framed can sometimes increase the effectiveness of a campaign through two main mechanisms. First, frame disputes can be strategically useful by allowing an issue to resonate with two different audiences. Rather than increasing competition for scarce allies and resources, frame disputes may actually augment their availability by appealing to audiences that provide mutually reinforcing and complimentary, rather than substitutable, forms of support. Second, just as local and international audiences have different priorities and vulnerabilities, so do states and their societies. A careful division of framing techniques that are targeted at these disparate priorities can be more effective than if a transnational movement adopts a more unified approach. (Resnick 2009:56)

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<sup>6</sup> For a recent take on the negative outcomes of frame disputes, see Shriver and Adams (2013). The Czech environmental movement that they studied fragmented as a result of a frame dispute about perceived political opportunities and the subsequent participation of some activists in party politics, a tactic which had previously been eschewed by the movement.

Similarly, Kubal (1998) offers a useful distinction between two different “regions” of framing activity. Using a modified version of Goffman’s (1959) arguments in *The Presentation of Self in Everyday Life*, he analyzed the frames that anti-toxics activists employed in both the “front” region and the “back” region. Kubal (1998) found considerable variation in the activists’ claims depending on whether they “were presented for universal public consumption” in the front region or were limited to “organizational meetings, personal conversations, personal interviews, and within-movement literature” in the back region (543). In the back region, activists often characterized the environment as a victim, disparaged their opponents, and used more radical rhetoric. In the front region, however, humans were more often portrayed as victims, a proposed incinerator was the focus of adversarial claims, and activists used rhetoric that emphasized individual agency.

Kubal (1998) concludes that these regional differences in framing are necessary in order to expand the boundaries of movement identities, since “In the back region, activists must motivate ideologically similar adherents to fight political battles with real people. Conversely, in the front region activists must reach out to and recruit an ideologically dissimilar bystander-public” (547). This regional division of interpretive labor, according to Kubal (1998), “may allow social movement groups to transcend the common tensions between radical and moderate political activity” (550). In addition, his findings parallel those of Lichterman (1995) inasmuch as the emphasis on individual agency and fulfillment creates space for a wide range of political approaches.

Here we see the full picture. Frame disputes sometimes generate a division of interpretive labor across a movement. This division of labor allows the movement to reach a more diverse audience of potential adherents and sympathizers. SMOs become interdependent on each other because of the framing expertise that each group possesses; each fill a niche of the overall movement's framing activity. However, if one of these organizations folds, there is a chance that the interpretive labor they undertook on behalf of the movement will suffer. The "interpretive chasm" that Benford describes is then a very real possibility.

All of this might lead us to wonder about the limits of the concept of frame disputes. At what point do disagreements over versions and visions of reality go beyond the "rim" of framing concepts? Is it still appropriate to speak of frames when it seems that people are comparing "incommensurable" ideas (Kuhn 1970), or parties to a conflict are "talking past each other" (Hoffman 2011)? It would seem that frame resonance disputes would be helpful to an overall movement only insofar as its constituent SMOs share a common prognostic frame. In fact, it may not be possible to engage in a frame resonance dispute if the prognostic frame is disputed as well. Each core framing task contains the accumulated assumptions of the tasks that precede it. This is not to say that movement organizations do not frequently go "back to the basics" in order to reframe their diagnoses and prognoses – this kind of dialectical reflexivity likely serves to improve the effectiveness of collective action framing. Rather, my point is that it does not enhance a movement's chances of success if adherents are disputing

the means of entirely different ends. Under such conditions we might well wonder what it is that adherents are actually adhering to – whether the dispute has spilled over the rim of the frame and dissolved any unifying ideas.

It is in this sense that frame disputes can be regarded as failures of intramovement social control. But in another sense, frame disputes can be thought of as an analytical antidote to “the illusion of unanimity” in social movement studies (Turner and Killian 1972). As the research on frame disputes reviewed here shows, the differential framing that occurs when activists are confronted with new situations lays bare the subtle contours of discourse within a movement. As a concept, then, the frame dispute creates conceptual space for researchers interested in detailing the influence of intramovement contention on the accomplishment of discursive solidarity. This is because the very act of identifying a frame dispute requires an appreciation for the difficulties inherent in frame maintenance, foregrounding the dynamic character of framing by emphasizing the interactive elements of their always-ongoing negotiation.

One area where researchers can certainly find evidence of frame disputes is within the environmental movement. As this review has shown, negotiations between EMOs about the “appropriate balance” between human beings and the world that surrounds us are readily observable. Since environmental movement organizations often rely heavily on the products of environmental science<sup>7</sup> to frame their calls for

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<sup>7</sup> When applied to the study of science, social constructionism emphasizes the “contingency” of the scientific enterprise (Hacking 1999). What this means is that our ideas about the objects of science are constructed; this means that it is possible that they could have been constructed in a number of other plausible ways. Relatedly, the recognition that science is contingent implies that scientific facts are merely

social change and mobilize support (Yearly 1994), an analysis of frame disputes within the environmental movement would also presumably highlight the peculiarities associated with framing activities that involve a high degree of scientific and technical rhetoric.

The section that follows briefly explains the geoengineering controversy, after which I outline a method to study frame disputes over these proposals.

### *Geoengineering*

Armed with increasingly dire predictions from climate scientists, environmental activists have begun to lament that we now live on a new kind of Earth – that the planet which has sustained humanity thus far no longer exists (McKibben 2010). Bill McKibben is a leading voice within the environmental movement. He leads a prominent EMO called “350.org,” which was named after a long-surpassed atmospheric carbon dioxide threshold. Reducing atmospheric carbon dioxide below this threshold of 350 parts per million (ppm) is important, according to 350.org<sup>8</sup>, “if humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is

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imperfect representations of the world around us. Nominal representations of the world around us are subjected to processes that are external to the subject of scientific inquiry, since the interests, tools, and perspectives of individual scientists are promoted through their social networks. The stability of scientific facts, according to the constructionist, depends largely on these external factors rather than internal factors such as the robustness of “traditional” methods of science. This is why some have referred to science, like war, as “politics by other means” (Latour 1988:229).

<sup>8</sup> <http://350.org/about/science/>

adapted.” But in 2013, NOAA reported<sup>9</sup> that concentrations of atmospheric carbon dioxide had peaked above 400 ppm at their Mauna Loa, Hawaii observatory for the first time since measurements began in 1958. These observations have prompted a discursive shift among climate scientists<sup>10</sup> that has not gone unnoticed by the environmental movement.

Briefly, the controversy surrounding geoengineering is as follows.

Anthropogenic climate change has ensured that the negative consequences of excess carbon dioxide emissions will be felt in the coming years. If we can somehow “manage” the effects of solar radiation in our atmosphere or “capture and store” a portion of the excess carbon dioxide that we emit, we might be able to blunt some of those negative consequences. There are two broad approaches to geoengineering currently being discussed.

The first is known as solar radiation management (SRM), and involves blocking the absorption of solar radiation by spraying aerosols into the atmosphere or constructing large reflective surfaces in space. The second is known as carbon capture and storage (CCS), and describes a range of actions designed to remove excess carbon dioxide from the atmosphere and sequester it. Both kinds of climate engineering proposals have generated strong scientific and public opinion.

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<sup>9</sup> <http://www.esrl.noaa.gov/news/2013/CO2400.html>

<sup>10</sup> At a 2014 symposium at the University of South Florida, the chair of the United Nations’ Intergovernmental Panel on Climate Change (IPCC) responded to a question about various proposals to engineer the climate by offering measured support for certain technologies that would capture and store carbon dioxide (Pachauri 2014).

People discuss geoengineering (often also referred to as “climate engineering”) in the comments section of news articles devoted to the subject, and on the webpages and blogs of environmental movement organizations. Geoengineering proposals potentially represent a discursive reorientation toward carbon dioxide. How do environmental movement organizations represent these controversial proposals to potential adherents, opponents, and other audiences?

A press release focused primarily on the fossil fuel divestment campaign posted to the 350.org website portrays geoengineering as a socially inequitable Hail Mary. According to this EMO, only clean energy solutions will fix the climate change problem, and further: “Those solutions should not include geoengineering, nuclear, and other ‘false-solutions’ that impact poor and vulnerable communities. With clean, just, and renewable energy sources so readily available, getting lost in a discussion about last-ditch technologies to save the planet is a dangerous distraction.”

But 350.org is only one star in the constellation of conversations about geoengineering within the environmental movement. As the remainder of this study will show, other EMOs developed a very different take on geoengineering proposals that can be observed in their online discourse and interactions. In the following chapter, I outline the data and the method through which the present study is conducted.

### CHAPTER THREE: AN APPRECIABLE PERIOD: STUDY DATA AND METHODS

My aim in this research is to explore how the environmental movement makes sense of geoengineering proposals. Several methodological decisions were made in planning this study. This chapter outlines these decisions in a more straightforward fashion than they actually occurred, as though the ultimate results of the study (to be discussed in the chapters following this one) flowed naturally from my first instincts about the data. In truth, this study was conducted via a series of fits and starts, and restarts. To put it in more flattering terms, the research process was highly iterative, as tends to be the case with much qualitative work.

Qualitative methods, of course, are uniquely suited to assess interactive processes and interpretive concerns. I sought to represent EMOs framings of geoengineering faithfully to describe how organizations construct reality around these nascent proposals. To accomplish this goal, I felt it necessary to suspend evaluations regarding the truthfulness or “scientific accuracy” of specific claims made by the actors in the study.

In what follows, I detail how organizations were chosen, how the research proceeded, and how the data were coded for analysis.



### *Online Observation*

Primary data collection was necessary because of the lack of prior research on framings of geoengineering within the environmental movement. Since I initially discovered geoengineering online, I thought it appropriate to make use of the online discourse produced by EMOs.

I observed geoengineering discourse online without direct interaction with movement activists. As a research method, observation (as contrasted with, for example, participant observation) confers certain advantages and disadvantages. For example, it is possible that people might feel more comfortable expressing themselves in a comment forum than they might in a fact-to-face interview with a social scientist. A disadvantage, on the other hand, is that it is impossible to redirect conversation, probe for elaboration, and so on. I do not mean to imply here that the choice of observation as a method eliminates the influence of the researcher on the discourse analyzed. Quite to the contrary, what the researcher chooses to observe must be properly justified. In other words, choices of search engine, search terms, EMOs, and so on ought to be theoretically motivated. Another potential issue has to do with the extent to which a researcher can access intramovement discussions about representational tactics without in-person participant observation. However, I assumed that geoengineering is a topic that most people discover for the first time online, as I did. Thus, it seemed highly appropriate to observe online movement activities surrounding geoengineering.

As a cultural product, the internet is both new and “not so new.” It is new in the sense that it is a relatively novel communication medium, but it is also “not so new” since much online discourse is reflective of pre-internet social processes and structures (Wilson and Peterson 2002). Although the Internet provides access to a large amount of potential data and has other advantages, such as unobtrusiveness, there are certainly some limitations to any study of this kind. Researchers who choose to utilize online discourse must adjust traditional definitions of the research setting (Garcia, Standlee, Bechkoff and Cui 2009), among other concerns.

Analyzing online discourse certainly has some advantages, however. For example, it has been understood for some time now that the internet allows people to create or join groups based on common values and interests, without the need for physical proximity. Online forums have been shown to be spaces where members discuss and adjust organizational strategy, develop shared vocabularies of motive, collectively define the past, and perhaps even cultivate common values and beliefs (da Cuhna and Orlikowski 2008). In addition, the researcher is able to access the discourse produced by online groups with relative ease. Further, it has been argued that online communication may enable people who are concerned about the decline of the ecosystem to participate in socioenvironmental controversies and governance issues anywhere in the world (Buscher 2013). These characteristics of online spaces make it possible for people to come together and make sense of nascent environmental issues or

other things-in-the-making that may not yet have reached a high level of societal awareness.

When people are online, they must represent themselves and, importantly, be responded to by others. This is different from our interactions offline. In offline interaction we need only to be seen to be regarded; it is not necessary to speak, let alone write out thoughts for virtually anyone, at any time, to access. Identity construction is a deliberate process online, and constructions of the self, the other, and communities like EMOs are accomplished through textual discourse. As sociologists have long known, we understand ourselves through our interactions with others (Mead 1934; Blumer 1969). Internet discourse allows researchers to access a bounded discursive context to examine the social, interactive process by which the environmental self is produced in concert others (Markham 2008). Further, it has been suggested that to “[understand]...people in everyday life now means considering computer-mediated communication” in addition to traditional ethnographic sources of meaning construction (Hallett and Barber 2014).

The public quality of online interactions is also noteworthy, and has a number of different implications for the present study. For example, we should expect that people who post online are very much aware that their representations are subject to public scrutiny, and will employ discursive strategies commensurate with the situation. Highly contentious infighting or other kinds of heated rhetoric is likely be restrained in these frontstage areas. Finally, silences and omissions are also relevant to their

definitions of the situation, impossible though these may be to “observe” in the traditional sense (Clarke 2005:175-176).

### *Case Selection*

I began by focusing on a few prominent EMOs that were already familiar to me, such as 350.org, Sierra Club, Greenpeace, and the Environmental Defense Fund. These organizations are heavily involved in Internet-based activism, and environmental issues are regularly written about on their websites and discussed in the comments sections. After my initial exposure to the online geoengineering discourse within the movement, the number of EMOs included in the study grew. Table 1 lists the EMOs in the study.

EMOs like these often post blogs, newsletters, photos, videos, and other forms of movement literature on their websites that are relevant to their portrayals of geoengineering. Though these materials are posted online, certain steps were taken to ensure against potential data loss. For example, I saved webpages in “html” file format as well as in “pdf” format<sup>11</sup>. This allowed me to access the geoengineering discourse I had collected without fear that the webpage in question would no longer be indexed and searchable, or might otherwise be altered between the data collection and analysis phases of the study.

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<sup>11</sup> A small number of documents originally posted in “pdf” format were preserved as such.

**Table 1: EMO Geoengineering Discourse Online, 2005-2015**

Organization	Blogs	Press Releases	Newsletters	Other <sup>12</sup>	Total
350.org	2	1	0	0	3
Climate Reality Project	2	0	0	1	3
Earthjustice	1	0	0	1	2
Earth First	0	0	5	0	5
Environmental Defense Fund	13	0	0	4	17
Friends of the Earth	5	2	0	1	8
Greenpeace	6	0	0	1	7
National Audubon Society	0	0	2	0	2
National Wildlife Federation	1	0	0	0	1
Natural Resources Defense Council	0	1	0	2	3
Nature Conservancy	1	0	1	1	3
Rainforest Action Network	1	0	0	0	1
Sierra Club	5	0	5	8	18
Union of Concerned Scientists	7	0	0	2	9
Wilderness Society	0	0	0	1	1
World Wildlife Fund	1	1	1	0	3
Total	45	5	14	22	86

My selection of EMOs for analysis was theoretically motivated<sup>13</sup>, and is not intended to be a representative sample of the environmental movement discourse surrounding geoengineering. The EMOs analyzed were chosen from two comprehensive surveys of environmental movement organizations in the United States (Bosso and Guber 2005; Brulle 2007:89). From these studies I selected EMOs that were previously familiar to me either from media coverage or from the scholarly literature on the environmental movement. Any EMO that produced English-language online content about geoengineering during the 2005-2015 period was eligible for inclusion in

<sup>12</sup> Other types of documents included announcements, articles, book and film reviews, an eco-vocabulary quiz, interviews with authors, a "message from the chair," news briefs, a petition, Q&As, a report, a strategic plan update, and web pages.

<sup>13</sup> At this point I should make it clear that I do not intend to test specific hypotheses. However, Blumer noted that "sensitizing concepts" like that of the frame dispute give researchers "a general sense of reference and guidance in approaching empirical instances," merely suggesting "directions along which to look" (Blumer 1954:7). It is my intent to refine and extend pre-existing concepts only insofar and in the event that my analysis allows for it (Snow, Morrill and Anderson 2003).

the study. Organizations that did not produce online content about geoengineering were excluded, since such organizations would presumably not produce the kind of content necessary to answer the research question.

Using a popular Internet search engine<sup>14</sup> to reach the webpages of these EMOs, I then proceeded to search within the websites<sup>15</sup> using key geoengineering-related terms and phrases<sup>16</sup>. This ultimately resulted in a total of 16 EMOs who had discussed geoengineering online during the study period (2005-2015). In all, this data collection strategy resulted in 86 distinct webpages or other online documents that mention geoengineering proposals. After briefly discussing the decade-long study period, I explain how the geoengineering-related framings contained in these webpages and documents were categorized.

The 2005-2015 study period was chosen for a couple of reasons. First, geoengineering proposals had only just entered the online environmental movement discourse in earnest during the early part of the period. Environmental researcher Paul Crutzen (2006) and environmental advocates such as Stewart Brand (2009) were beginning to explore these proposals as technologies of last resort, and exhorted environmentalists to explore their potential in the face of an increasingly carbonized planet. I wanted to capture the interactions of EMOs with these initial voices of support, as it was clear to me that what was being proposed essentially flipped the script on the

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<sup>14</sup> [www.google.com](http://www.google.com)

<sup>15</sup> Most of the websites featured their own internal search engines that compile pages containing relevant geoengineering keywords. Others required an extensive “manual” search process.

<sup>16</sup> Such keywords included “geoengineering,” “climate engineering,” “climate intervention,” “carbon capture and storage,” and “solar radiation management” among others.

carbon dioxide emissions narrative. Second, and relatedly, the decade-long study period was chosen to capitalize on the initial uncertainty that often results from new technological proposals and to maximize the possibility that variation in geoengineering-related framings might be observed over time.

### *Coding Procedures*

During my initial encounter with the data, I wrote extensive analytic memos detailing the formative visual and thematic characteristics of the geoengineering-related webpages and documents posted by the Sierra Club. Figure 1 shows part of an article written by “active Sierra Club member” Chris Gehlker, an example of the geoengineering discourse produced within the movement. This particular article sat atop page 10 of the winter 2011 newsletter of the Grand Canyon Chapter of Arizona, taking up about two-thirds of the page. Note the “Schematic representation of geoengineering proposals” in the top right corner. Illustrations such as this were quite common in the geoengineering discourse.

This initial, pilot study approach was followed by a careful and intensive reading of the data from all 16 EMOs for themes, focusing in particular on discourse concerned with representational strategy. Thus, the initial period of data collection primarily consisted of a survey, so to speak, of the discursive field surrounding climate engineering in order to establish generic categories of representation. As in earlier studies of frame disputes, these categories produced observable differences with respect

to which geoengineering issues were pertinent to the movement, how these issues should be represented, and to which audiences these representations should be directed.

10 Sierra Club
Grand Canyon Chapter

### Gee-Whiz: Technological Fixes for Climate Change

By Chris Gehlker

**No Space, No Time**

This subject is way too big for one article. Please see "Engineering the Climate: Research Needs and Strategies for International Coordination" at <http://bit.ly/bsanYY> and "Geopiracy" at <http://bit.ly/c1VYAA> or "Retooling the Planet" at <http://bit.ly/hkbcPQ>. These documents give a good introductory overview and a balanced view of the issues. There is also a longer version of this article on the Wiki (<http://canyonecho.wikispaces.com>). Please comment there.

**An Inconvenient Truth**

Serious climate scientists believe that we are close to a climate tipping point, if we haven't passed it already. Consequently, an array of gee-whiz technologies, typically labeled geoengineering, has been proposed to deal with the situation. These technologies

that are geoengineering break down into two broad categories.

**Solar Radiation Management**

*Aerosol sulphates in the stratosphere:* Pumping aerosol sulphates or aluminum nanoparticles into the stratosphere to block sunlight.

*Cloud whitening:* Spraying seawater into the atmosphere to increase the reflectivity and condensation of clouds.

*Space sunshades:* Launching trillions of small free-flying spacecrafts, or space mirrors, a million miles above the earth.

*Albedo enhancement:* Increasing the reflectivity of the Earth's surface by planting crops genetically engineered to be whiter or shinier, or covering desert regions or mountains with reflective white material.

**Carbon Dioxide Removal or Air Capture**

Schematic representation of geoengineering proposals. Diagram by Kathleen Smith, LLNL.  
Carbon-sucking machines or synthetic from melting Siberian ice where reducing

It would take a very long book to introduce all the important, accurate and visionary ideas that ecologists, environmentalists and biophysical scientists have contributed to society: Organic farming, voluntary simplicity, transition towns, environmental rights, the conserver society and so forth. Ecologists such as Paul Shepard, Chellis Glendinning and Kathy McMahon examined the psychological impact of the ecology crisis. Arne Naess introduced 'Deep Ecology' and 'richer lives with simpler means'. Vandana Shiva, Mary Jo Breton, Rosemary Ruether and others describe the importance of feminism for ecology. Southern hemisphere nations such as Bolivia have raised the issue of environmental justice. Gregory Bateson introduced the link between mind, cybernetics and ecology, and wrote "My knowing is a small part of a wider integrated knowing that knits the entire biosphere of creation."

The anti-environmental sophists bark for their patrons like the medieval henchmen who burned scientists and healers at the stake and conducted inquisitions and pogroms. And like those agents of institutionalised ignorance, they will end up on the wrong side of history.

But being wrong isn't the problem. The problem appears in the destruction and suffering caused by this deceit, misinformation and propaganda. Every day, as Earth spins through the heavens, species blink from existence, cancers and illnesses attack people, children starve and communities suffer.

We aren't quibbling about facts here. We're battling for lives.

-Rex Weyler

You can respond to "Deep Green" columns at my *Ecolog*, where I post portions of this column

Figure 1: Two Examples of Online EMO Geoengineering Discourse



Following Benford (1993:682), I characterized frame disputes as events where movement representatives indicate disagreement regarding one or more of the following:

1. The *content* of proposed framing activity
2. The *manner* in which the organizations or the movement should attempt to affect the interpretation of various audiences, or
3. The *audience* toward which the framing activity should be directed

Each dispute was categorized accordingly, and was subsequently coded according to three generic forms of framing activity: diagnosis, prognosis, and frame resonance. This often resulted in overlapping codes; for example, even relatively brief framings sometimes included both an evaluation of geoengineering as a solution (prognosis) and a discussion of how geoengineering should be represented (frame resonance).

The segments of text coded as frame disputes were sometimes as short as a phrase, while others were a few paragraphs in length. More important than constraining the length of the segment was a desire to faithfully present the entire context of the disagreement. Thus, some coded segments were quite brief while others were extensive by comparison.

In a final round of coding, I sought to differentiate between the two broad discursive factions that emerged during the analysis. Thus, I classified each comment as either “purist” or “pragmatist,” depending on whether the comment exhibited

suspicion or support (respectively) for geoengineering proposals. While admittedly superficial, these ideal-typical discursive categories give a rough idea of the amount of discursive activity generated by each faction over the course of the study period, and make it possible to characterize the general state of the geoengineering discourse within the movement.

## CHAPER FOUR: PROGNOSTIC FRAMING AND ITS (DIS)CONTENTS

Chapter four examines framing disputes between EMOs over geoengineering proposals. Together, this chapter and the following chapter document the framing activities of EMOs as they make sense of these controversial proposals and attempt to articulate an understanding of geoengineering that will resonate with various audiences. As will become clear, this research affirms that the study of online interactions can enrich social movement studies and allow social scientists to observe interactions which are traditionally thought to require the kind of access afforded by in-depth participant observation. Further, the analysis suggests that paying particular attention to disputes over the manner in which organizations should attempt to affect the interpretation of various audiences foregrounds highly interactive framing processes and avoids casting frames as uncontested, static, behind-the-scenes byproducts of a discursively monolithic social movement. Finally, the study of framing disputes may be able to tell us something about the difficulties involved in presenting diagnoses and prognoses in a way that will strike a responsive chord and mobilize people to take action on behalf of the environmental movement.

A blog post on the Greenpeace UK website from 2008 offers a portrayal of one of the issues at stake for EMOs as they attempt to affect the interpretation of various audiences, and also hints at some of the methodological difficulties involved in the study of contentious framing:

...of concern here is not so much what the Royal Society say in a cautious scientific exploration of the topic, but how their work gets presented. Indeed, a quick look at the coverage of the report shows a spread of headlines: From the cautious: Hopes dashed for geo-engineering solutions (*The Financial Times*) To the ambiguous: Engineering a Climate Solution (*The New York Times*) Investment in geo-engineering needed immediately, says Royal Society (*The Guardian*) To the positively enthusiastic: Cloud ships and artificial trees could offer last hope to save climate, say British experts (*The Daily Mail*) Geo-engineering should be developed as insurance against dangerous climate change (*The Telegraph*) and Could mechanical trees save the world? (*BBC*) [Greenpeace, 2008, blog post]

Referring to the Royal Society's report on geoengineering which had recently been published the author of this blog post notes with concern the range of news coverage surrounding the report. Concerns about how a scientific report about geoengineering "gets presented" – whether cautiously, ambiguously, or enthusiastically – reflect Greenpeace UK's awareness that EMOs engage in framing activities on a crowded stage. Newly-emerging environmental technologies like geoengineering generate discourse inside and outside the environmental movement from scientists, the media, policy evaluators, and so on. Indeed, it is often difficult as a researcher to draw boundaries around the many different types of actors involved.

The Greenpeace UK blogger also gave an account of his conversation with Greenpeace chief scientist Doug Parr about the Royal Society report:

Doug and I had a chat about his views of the report and geoengineering more generally, and he had this to say: We have no concerns with The Royal Society's presentation of this, because they led by saying that geo-engineering is not a substitute for mitigation... But we worry about how it might be received and understood by others.

Geoengineering is not a plan B for the climate, it should be used only in desperation, can have their [sic] widespread undesirable impacts, and raises major ethical and political issues of its own. It may be very expensive, and it may well never work. [Greenpeace, 2008, blog post]

A couple of things are worth noting about this “chat.” First, it is notable that Dr. Parr is reassured that the Royal Society said that geoengineering “is not a substitute for mitigation.” Thus, he is not concerned about the content of the report, but rather about “how it might be received and understood by others.” Could it be possible that discussions about geoengineering might prompt a reframing of our understanding of climate change?

Relatedly, the blogger’s reported conversation with Dr. Parr shows how emergent technological proposals generate observable social interactions that are typically thought to require the kind of access that can only come from in-depth participant observation. At the outset of this study, it was not clear whether the online discourse surrounding geoengineering would reveal much about how EMOs like Greenpeace make sense of controversial new technologies. Luckily that was not the

case. EMOs frequently disagreed with other EMOs over what geoengineering means and how it should be discussed – or whether it should be discussed at all.

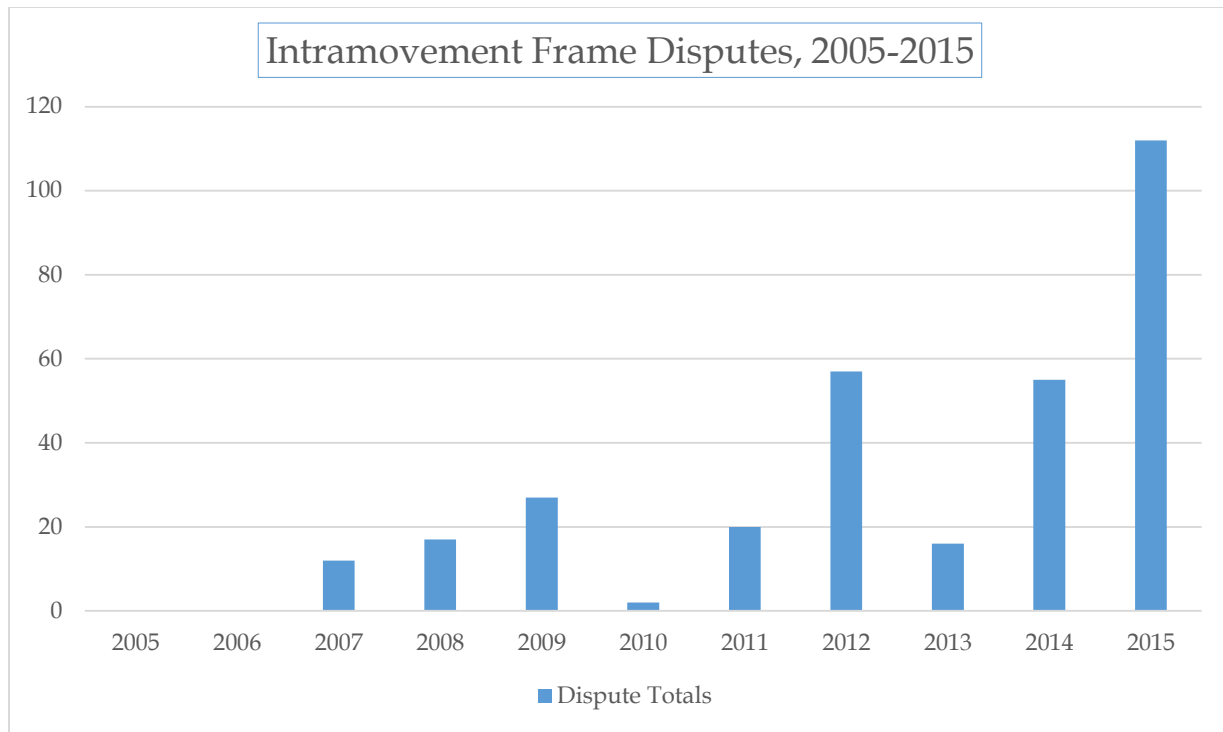
### *Overview of Frame Disputes*

In the remainder of this chapter, I explore the breadth of perspectives on geoengineering across 16 EMOs. I coded instances where at least two EMOs indicated a difference of opinion about one or more aspects of geoengineering, which resulted in a total of 142 intramovement frame dispute comments. New technologies are often controversial, and there were indeed many differences in geoengineering definitions and evaluations. With little exception, intramovement framing disputes over geoengineering occurred with increasing frequency over the time period analyzed, as Figure 2 illustrates.

There are a couple of things worth noting here. First, after a steady increase in discursive activity from 2007 through 2009, there seemed to be an abrupt drop-off in the number of frame disputes over geoengineering in 2010<sup>17</sup>. This lull in discursive activity is not reflected in internet search trend data, which shows steadily increasing interest in geoengineering over the period of analysis among Google users.

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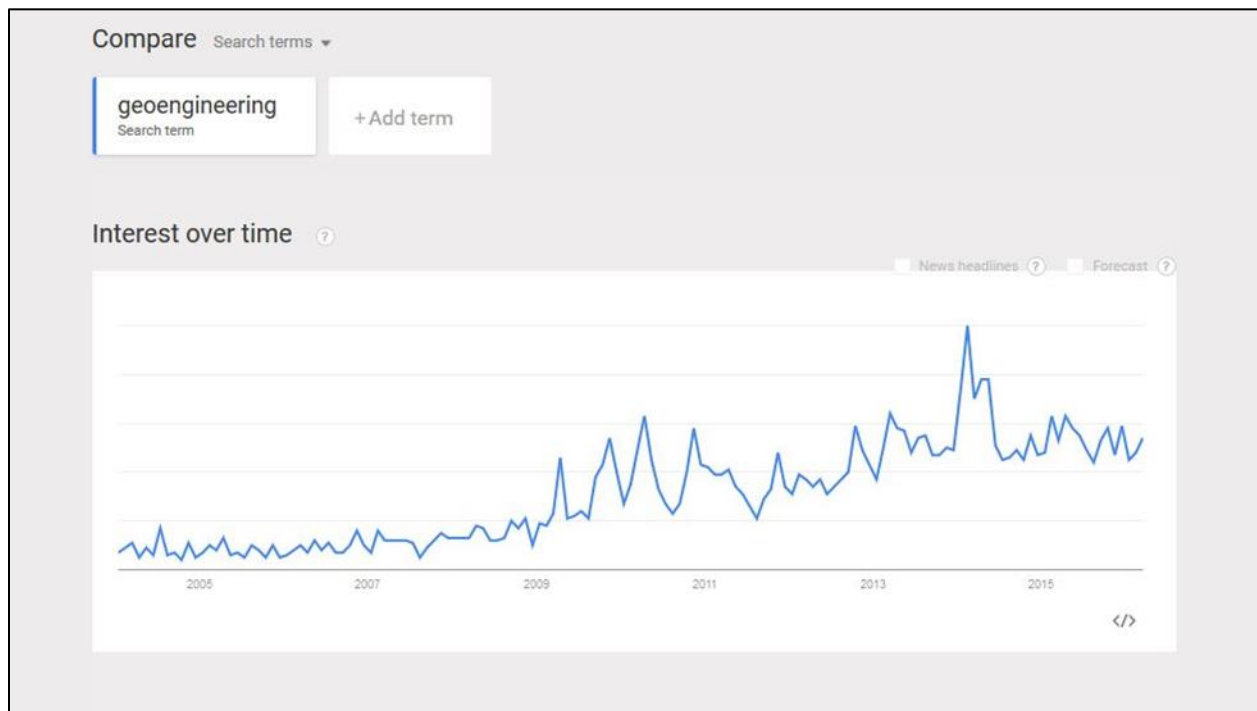
<sup>17</sup> The BP Oil Spill may have dominated much of the environmental movement discourse that year. This possibility was suggested to me by a colleague at the 2016 annual meeting of the Southern Sociological Society.



**Figure 2: Total Number of Intramovement Frame Disputes, Coded By Year, 2005-2015**

The second thing worth noting is that, following the 2010 lull in framing activity, the number of disputes over geoengineering again resumed its upward trajectory, with 2015 ending as the most discursively active year. The general pattern appears to be one of increasing discursive activity surrounding geoengineering proposals, both in the public as well as within the EMOs that I observed. This increase in discursive activity surrounding geoengineering generated more intramovement frame disputes as time went on. Indeed, the vast majority of frame disputes occurred during the latter half of the time period analyzed. Almost 79% of the intramovement disputes about geoengineering were coded as disputes over content, though disputes over the manner

in which the movement should try to affect the interpretation of its audiences were also fairly common (29.6%). Disputes over which audiences should be the target of framing activity were very infrequent (3.5%), and are thus excluded from the remainder of the analysis<sup>18</sup>.



Data Source: Google Trends ([www.google.com/trends](http://www.google.com/trends))

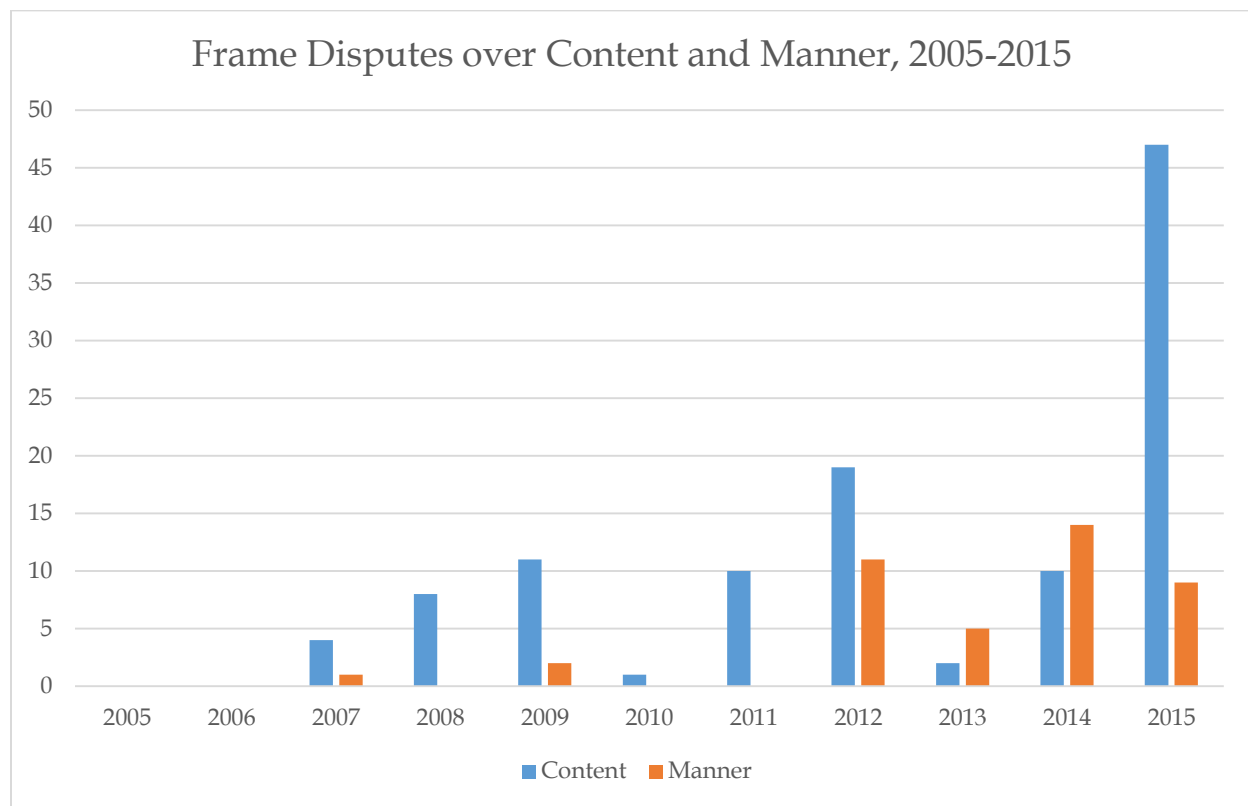
**Figure 3: Google Searches for “Geoengineering,” 2005-2015**

The extremely high number of disputes over framing content is likely an artifact of the emergent quality of geoengineering proposals. I chose to analyze the movement

<sup>18</sup> Percentages total over 100 due to overlapping codes.

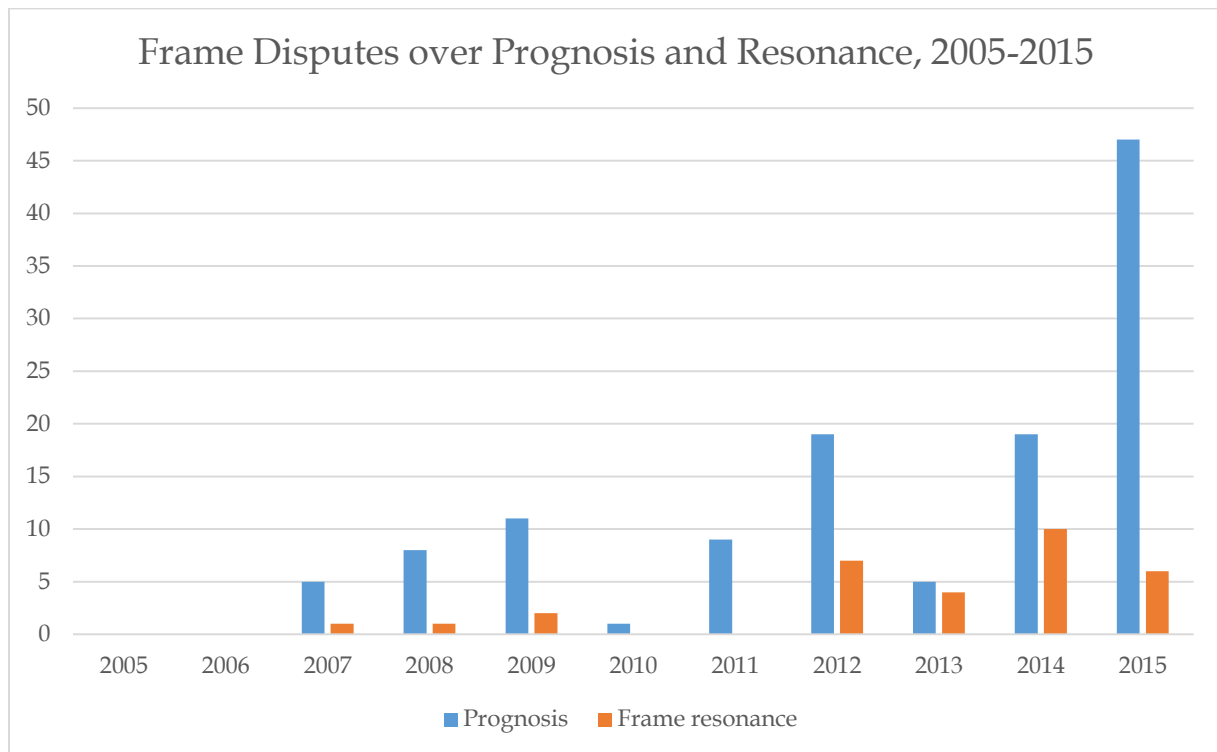


discourse surrounding geoengineering precisely because of this emergent quality. Geoengineering proposals are nascent technoscientific phenomena, and it is my hope that analyzing the discourse surrounding this particular topic will allow me to shed some light on the process by which EMOs seek to present prognoses in a way that will strike a responsive chord and mobilize people to take action on behalf of the environmental movement.



**Figure 4: Intramovement Frame Disputes over Content and Manner, 2005-2015**

When EMOs disagreed over framing content, these disagreements most often revolved around prognostic framing activities. This outcome is hardly surprising. Geoengineering proposals are presented as solutions to the climate change problem. Thus, when organizations disagree about which methods constitute acceptable forms of geoengineering, for example, these disputes over content are also disputes over how we should change our climate reality.



**Figure 5: Intramovement Frame Disputes over Prognosis and Resonance, 2005-2015**

As the chart above shows, prognostic disputes were by far the most common source of disagreement with respect to core framing tasks. Disputes over prognosis were evident in over 87% of the analyzed data. Frame resonance disputes were also fairly common (21.8%). Diagnostic disputes were rare (3.5%), though some care will be taken to delineate the mutually-reinforcing dynamics of diagnoses and prognoses in framing activities that I observed<sup>19</sup>.

I suspect that the high degree of overlap between disputes over content and prognosis on the one hand, and manner and resonance on the other, relates to my own particular understanding of these phenomena, and deserves further explanation. Discourse coded as disputes over content, what I view as the “what” of framing, tended to be over fundamentals such as: Should we support research into geoengineering, or not? Other disputes relating to content had to do with what constitutes geoengineering. Do large-scale tree planting campaigns count as geoengineering? Does point-source carbon capture and storage count as geoengineering? Likewise, disputes that were coded as relating to the “manner” of interpretation largely overlapped with those that were subsequently coded as frame resonance disputes. These were disputes over the “how” of framing: How should EMOs talk about geoengineering proposals to their followers, opponents, or the media? Should geoengineering proposals even be discussed at all, or does the movement risk tacitly legitimating them by so doing?

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<sup>19</sup> Percentages total over 100 due to overlapping codes.

A few noteworthy episodes of contentious framing occurred during the 2005 to 2015 time period. EMOs frequently indicated differences of opinion with each other about how to define geoengineering, and often had divergent evaluations of the feasibility and ethics of geoengineering proposals. It was during this time that geoengineering became increasingly mentioned as a possible response to the issue of climate change. Journal articles, reports authored by various scientific bodies, and news reports of “rogue” geoengineering experiments tended to produce contentious framing activities as EMOs sought to develop and refine their framing of this issue over time amid an atmosphere of uncertainty. The remainder of this chapter examines how EMOs developed their framings of geoengineering across time, and how the initial consensus about geoengineering within the movement dissolved into a frame dispute. It is my hope that this analytical strategy will yield useful and needed contributions to the social movement framing literature.

### *The “Veneer of Plausibility”*

In an April 2007 blog post titled “Can We Engineer Our Way Out?” Bill Chameides of the Environmental Defense Fund (EDF) writes that it is “premature to contemplate such drastic measures” like “using planetary-scale engineering to counteract climate change.” Bill was writing in response to the growing number of geoengineering proposals that were being put forward at the time, noting that one of the “staunchest proponents” of SRM “is Paul Crutzen, winner of the Nobel Prize for

Chemistry for his work on stratospheric ozone depletion (and also, incidentally, a colleague of mine).” Bill’s friendly disagreement with his prestigious colleague establishes EDF’s position on the geoengineering method that nearly all EMOs regarded as potentially dangerous.

A rather prominent framing adopted by EMOs during that time, especially when discussing SRM, involved the notion of unintended consequences:

...we just don’t know what may happen when we start tinkering with the planet. Ed Tenner has a great book on this subject titled *Why Things Bite Back*. One of the many examples he gives is refrigeration technology. We wanted to use something other than toxic ammonia for cooling so we turned to chlorofluorocarbons, but these turned out to have a dangerous effect on the ozone layer. [Environmental Defense Fund, 2007, blog post]

Here Bill Chameides invokes an example that is familiar to environmental activists to make the point that tinkering with the planet may be dangerous.

Judging by the comments following his post, it seems that readers generally agreed with EDF’s take on this form of geoengineering. “Enrique” expounded on Chameides’ theme of unintended consequences, providing an additional example, “I am not a scientist but this seems some wild idea even if it comes from a Nobel Prize Chemistry winner. Didn't the chemists gave us nitrogen based pesticides which is polluting our river?” while Patrick Kennedy, in a rather succinct echo of the post, warns readers to “Beware the unforeseen consequences of ‘engineering fixes!’”

Lisa Moore contributed to a series of EDF blog posts written during 2008 about the two major geoengineering methods. Moore's post dealt with SRM, and made extensive use of "a recent paper in the Journal of Geophysical Research" documenting its possible side effects, including decreases in summer monsoon systems, "on which billions of people rely for food and water supplies." She ended her post by likening SRM to methadone treatment for heroin addiction: "As RealClimate scientists put it in their coverage of the latest paper, geo-engineering is like methadone: 'an emergency treatment to substitute one addiction (carbon emissions) with another.' What we really need to do is tackle the root of the problem and decrease greenhouse gas emissions" [Environmental Defense Fund, 2008, blog post].

In preparation for the 2009 climate summit in Copenhagen, Friends of the Earth (FoE) primed readers to the upcoming discussions by warning that "Some corporations, individuals and even governments are fostering panic and helplessness to push for untested and unproven technologies, as 'our only option'." This "proliferation of unproven technologies," according to FoE, is rendered more problematic due to the lack of "consideration of their ecological and social consequences" which could include, in the case of SRM, "widespread drought in equatorial zones, causing crop failures and worsening hunger." [Friends of the Earth, 2009, blog post]

By this point in 2009, Crutzen was not the only person who had mentioned SRM and other geoengineering methods as potential climate solutions. John Holdren, president Obama's new science advisor was talking of traveling "in a car with bad

brakes driving toward a cliff in the fog” in his first on-the-job interview. He told reporters<sup>20</sup> that the issue of geoengineering had been raised in discussions with “Cabinet officials and heads of sub-Cabinet level agencies, such as NASA and the Environmental Protection Agency.” But EMOs remained united in their opposition to these proposals.

Rainforest Action Network (RAN) summarized the gravity of Holdren’s “bad brakes” metaphor this way:

His point seems to be that if we don't take bold action very soon, we might get desperate as we face more and more of the consequences of climate change and have to consider drastic and frightening remedies. So, please, let's try to handle this before we have to look at crazy ideas like blocking out the sun. **See, this idea scares me.** Why? Because I think that's exactly what the humans tried in *The Matrix* and they just ended up with ruined cities, a perpetual lightning storm, and giant machines fueled by farming human bodies. Remember? [bold in original] [Rainforest Action Network, 2009, blog post]

Robin, the author of the post above, invokes popular apocalyptic imagery<sup>21</sup> to describe the possible consequences of a geoengineered earth. (Later in 2009, the Royal Society

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<sup>20</sup> <http://www.cbsnews.com/news/geoengineering-to-fight-global-warming/>

<sup>21</sup> Interestingly, WWF-UK blogger Jon Taylor offered an alternate take on Hollywood’s influence on solutions to the climate change problem, one that differed markedly from RAN’s apocalyptic scenario from *The Matrix*:

Unfortunately most of the public talk around geo-engineering, including the piece in the Sunday Times, is tempted to focus on solar radiation management rather than carbon dioxide management. Perhaps these approaches are easier to visualise by a generation brought up on Hollywood movies – or perhaps we’re more inclined to look for a short-term techno-fix rather than a less dramatic and longer-term effort to clear up our own mess. [World Wildlife Fund-UK, 2012, blog post]

would release the results of a report assessing the technical feasibility and ethical implications of geoengineering.)

FoE again stepped into the discursive fray in 2011 during climate talks in Bonn. The year before, the Convention on Biological Diversity had issued what FoE considered to be a “de facto moratorium” on geoengineering, but this year “Dangerous techno-fixes to the climate crisis are getting a lot of attention...Two blocks away from the climate talks, the Convention on Biological Diversity held a workshop today on geoengineering to discuss definitions, possible impacts and ‘regulatory gaps.’” FoE was concerned with the seeming-suddenness with which geoengineering proposals were then being discussed, complaining that “it seemed like countries were being sensible in recognizing the extreme and possibly irreversible dangers of geoengineering, but meetings like the one held today suggest there is strong momentum to get geoengineering underway quickly.” FoE went on to characterize the push to develop geoengineering research guidelines as “an exercise in futility and a dangerous distraction from the task at hand - reducing harmful greenhouse gas pollution in the countries that cause this problem” [Friends of the Earth, 2011, blog post].

In 2012, the Nature Conservancy painted a dire picture of the possible unintended consequences of geoengineering, placing geoengineering into the same category of “incalculable risks” as the Fukushima Daiichi nuclear disaster:

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Geoengineering proposals may be easier to visualize than ever before, thanks to Hollywood productions. For example, a recent film called *Snowpiercer* is premised on a geoengineering experiment gone awry. Books and films like this become part of the tactical repertoire of social movements, and influence the beliefs and actions of audience members (Vasi 2015).



Additionally, there is an increasing danger of natural disasters being directly triggered by human action or uncontrollable high technology. The nuclear super MCA of Fukushima in March 2011 is the most obvious example of this. Increasingly discussed proposals to permanently manipulate the climate by technological interventions in the shape of 'geo-engineering' bear a new dimension of incalculable risks for humans and for nature [citation omitted]. [Nature Conservancy, 2012, report]

Also as recently as 2012, the Natural Resources Defense Council (NRDC) argued that while SRM may be possible, it may unleash unintended consequences. Further, this method of geoengineering does not address the root issue:

While [shooting sulfur dioxide particles into the upper atmosphere in order to reflect incoming sunlight] would appear plausible from a mechanical standpoint, the veneer of plausibility only adds to serious concerns about unknown secondary effects, as well as worries that by taking an action such as this one, the root issue – our need to curb carbon emissions – would remain unaddressed. As a result, this is one of the most controversial geoengineering plans to date. It practically glows with the hubris of weird science; it scares people. [Natural Resources Defense Council, 2012, article]

Up to this point, the phrase “dangerous distraction” had been used quite frequently by EMOs to describe geoengineering proposals; this label served to succinctly frame two of the main objections that most of the groups that I analyzed expressed about SRM in particular. The word “dangerous” invokes the possibility of the unintended consequences of “tinkering” with the climate. For the vast majority of EMOs analyzed in this study, SRM was also deemed to be a “distraction” that does not address the root cause of climate change:

Geoengineering proponents have suggested injecting sulfate aerosols into the stratosphere to manipulate climate and counteract the effects of global warming. Because we now know that sulfate aerosols can have dramatic effects on regional precipitation patterns, strategies like these may be unnecessarily risky – especially when they won't address carbon pollution, the root cause of climate change. [Climate Reality Project, 2011, blog post]

Indeed, most of the groups I analyzed were by this point arguing that reflecting sunlight to mask some of the effects of global warming did not address a host of other climate change-related issues, let alone the root causes of climate change. One frequently mentioned problem that would be unaddressed by SRM was ocean acidification:

While ocean pH levels have fluctuated over time, acidity levels have increased at a much more rapid pace than in the past, and will continue to worsen if our CO<sub>2</sub> emissions continue unabated. And it should be noted that proposed 'geoengineering' solutions to global warming, such as injecting light-reflecting particles into the atmosphere, would do nothing to halt ocean acidification even if they succeeded in reducing temperatures (which is not a given). [Union of Concerned Scientists, 2011, blog post]

In September 2012, WWF-UK blogger Jon Taylor took up this theme in a September 2012 blog post for WWF-UK: "CDM approaches are likely to be longer-term and more expensive than SRM approaches. But they do address the fundamental cause of climate change and ocean acidification, which is that there's more carbon in the atmosphere than humans have ever encountered before" [World Wildlife Fund-UK, 2012, blog post].

Earth First, also in 2012, characterized SRM as “a false solution based on offloading the effects of global warming onto future generations.” For Earth First, rising sea levels was another issue that would go unaddressed if SRM were deployed:

...we are already committed to several feet of sea level rise, which is likely to displace tens of millions of people around the world and inundate ecosystems. While reducing warming through these techniques would slow the melt of mountain glaciers and ice sheets, it would do nothing to address the natural systems already in dire straits because of warming up to this point. [Earth First, 2012, newsletter]

Later, in January 2013, “Ned Ludd” of Earth First wrote a rather lengthy post commemorating the anniversary of the Luddite uprisings, marveling at the hubris involved in geoengineering proposals:

What’s important is not to discuss the (extremely scant) technical merits of such proposals, but to stand back for a moment, and realize where capitalist technocracy has brought us. As industrial capitalism has taken us to the point of destabilizing the entire climatic system of the planet, scientists are now seriously proposing to intervene in that system, about which next to nothing is understood. The over-confidence and hubris of technocrats has led them to a point where they feel able to literally play God with the basic life support systems of the entire planet, despite the colossal but incalculable risks that such an enterprise would entail, for the planet and for those other humans, in countries which will have no say in whether these technologies are used. This is the point at which they reveal themselves to be entirely out of touch with reality, and their technological rationality is revealed as simply insane. [Earth First, 2013, newsletter]

Ned's rhetoric may seem alarmist – after all, the vast majority of geoengineering proposals up to this point were approximately as tangible as a complex statistical model. Further, from 2005 to 2009 the environmental movement had largely been unified in their condemnation of SRM proposals as dangerous distractions from the root issue of climate change, namely, runaway carbon dioxide emissions. However, a rift had been developing over the previous few years with regard to SRM research and governance. By 2015, EDF had pitted themselves against FoE, Sierra Club, 350.org, and some of their own online readership over this issue, while claiming various levels of support from UCS, NRDC, and WWF-UK. A reference to the “mixed and sometimes internally inconsistent<sup>22</sup> positions on small-scale outdoor SRM research” adopted by their intramovement opponents offers evidence of a dispute that was by then a few years in the making. To understand how the apparent consensus about SRM splintered, it is necessary to examine the intramovement framing dispute that erupted from 2010 to 2015 over SRM research and governance.

*“As the World Warms...”*

By 2010, EDF had participated in the co-founding of the Solar Radiation Management Governance Initiative “...with the Royal Society and The World Academy

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<sup>22</sup> This charge is rather striking, since it could be argued that EDF's framing of geoengineering changed most markedly during the period analyzed when compared to the other EMOs analyzed. Bill Chameides' worries about “drastic measures” and “tinkering with the planet” shifted over time toward a desire to contribute to the conversation surrounding geoengineering research and governance. This shift in framing is documented in detail in the section that follows.

of Sciences, in order to engage a diverse and global range of voices to discuss SRM research and appropriate governance.” This initiative was established following the 2009 Royal Society report.

For some EMOs, concern about the unintended consequences of geoengineering shifted toward a desire to understand these very same consequences over time. EDF now believes that “Engaging in transparent small-scale field research to further our understanding of the climate system and the implications of any albedo<sup>23</sup> modification proposals is prudent and governance regimes should be established in parallel with the very first experiments.” This desire to understand the consequences of SRM is explained elsewhere, where EDF asserts that although “It would be criminally negligent to count on geoengineering to save the day”:

...we also think it makes sense to explore and understand the issue. As the world warms, somebody is bound to propose use of geoengineering technologies, or even deploy one of them. We need to understand the potential consequences before that happens.

[Environmental Defense Fund, 2015, web page]

It would seem that the fears articulated by EMOs such as Earth First, Greenpeace, and others – that geoengineering proposals represent a moral hazard which should not be pursued – were in part justified. But EDF has turned this framing on its head, invoking notions of rogue geoengineering experiments and science run amok in the absence of “more research and a clear, comprehensive governance effort on the part of governments and serious scientists.” Indeed, they seemed resigned by October of 2012

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<sup>23</sup> Albedo is a word used to describe the property of reflectivity.

that such a possibility was a matter of when, not whether: “Saying that we ought not to tinker with the planet on a grand scale – by attempting to create an artificial sun shield, for example – won’t make it so.”

In March 2014, EDF wrote a post about geoengineering, to which reader “Lewis Cleverdon” commented:

...it is very clear that we are actually already past the point where mitigation by Emissions Control alone could resolve the problem of AGW. The application of both modes of Geo-E is thus inevitably required, meaning that the development of UN governance of the options' research and potential accreditation via a mandated scientific agency is an urgent priority, and should be agreed at the Paris Conference in 2015.

[Environmental Defense Fund, 2014, reader comment]

Here Lewis transforms the precautionary principle from its usual interpretation, which he then reiterates by intimating the additional dangers of feedback from “warming seabed methane hydrates.” Most of the EMOs in this study employed the precautionary principle to emphasize the importance of inaction in the face of uncertainty, whereas Lewis advocates for geoengineering as “an urgent priority” because of melting arctic sea ice – the consequences of which are, for Lewis, another source of uncertainty.

EMOs such as FoE, Earth First, the Sierra Club, Greenpeace, and 350.org have not followed the lead of EDF, NRDC, and UCS who have, over time, indicated varying levels of support for geoengineering research and governance initiatives. In April 2014, FoE wrote a news release in response to the IPCC Mitigation Report that had just been released: “Rather than address climate change in a just manner, some governments

have pressured the IPCC to encourage technological miracles like geoengineering in its summary for policy makers. It is unconscionable to slow down the transition to renewable energy in the hope that convenient solutions will materialize from the ether” [Friends of the Earth, 2014, press release].

Just a few months later, Earth First worried that geoengineering might constitute a moral hazard, a fig leaf to provide cover for a lack of meaningful climate action:

What kind of climate action should be taken is a question that has long been debated by climate justice activists, organizations, social movements and Indigenous Peoples all over the world for decades. ‘Climate action’ can include things like geoengineering schemes—manmade manipulations of nature on such a massive scale that the impacts can’t possibly be known, but could definitely be catastrophic. [Earth First, 2014, newsletter]

Earth First was explicit in attributing the push to explore geoengineering options to “the firm if unstated belief that not all lives matter.” In their view, the preferred modes of production and consumption of “our governments” would likely result in some scary choices in order to prevent systemic change, concluding that “...it is distinctly more likely that our governments will favor these terrifying techno-fixes over approaches to emission reduction that are far more likely to succeed, in no small part because those solutions are being offered by poor people with darker skin” [Earth First, 2014, newsletter].

Up through the end of 2015, FoE and 350.org remained steadfast in their framing of SRM as a “false solution” that is prone to the threat of “unintended consequences”:

The side effects of geoengineering interventions are unknown and untested. In order to have any noticeable impact on global temperatures, geoengineering projects would have to be deployed on a massive, global scale. These 'experiments' would not only take action in the absence of scientific consensus, hence violating the precautionary principle, but could also easily have unintended consequences due to mechanical failure, human error, inadequate understanding of ecosystems, biodiversity and the Earth's climate, unforeseen natural phenomena, irreversibility or funding interruptions. [Friends of the Earth, 2015, press release]

Currently, EDF's response to those within the movement who fear that geoengineering may be a moral hazard inasmuch as it distracts attention from the root causes of climate change is hardly comforting: "Some people think the possibility of a technological 'fix' provides an excuse to justify emissions inaction. But usually the question is sincere: Do we have a backup parachute – is there a planetary-scale fix that can stop the warming if we fail to cut emissions in time?" Countering claims of moral hazard, EDF notes that geoengineering proposals are "usually" motivated by "sincere" motives:

To better understand the implications of this technology before there is a sense of urgency to use it to address a growing emergency, many scientists, including the authors of the NRC report, believe there are opportunities to conduct valuable small-scale outdoor SRM-related research with negligible physical risks. We argue that such research would not only give us information about larger scale research and deployment, it would help us better understand the climate system. [Environmental Defense Fund, 2015, article]



In 2015, UCS dismissed the moral hazard argument as well:

We need to better understand these technologies and their risks, even if we are determined to never deploy them. They are relatively low-cost, and if deployed unilaterally by others, would have global consequences. In the U.S. and internationally, societal debate over their use would be well served by better understanding their risks and consequences. A fuller understanding of their risks, informed by science, might well reinforce our collective determination to never use them and motivate greater commitment to mitigation and adaptation. And, should we falter in that effort, we would be well-served to better understand the impacts of such emergency-room measures.

[Union of Concerned Scientists, 2015, blog post]

The statements are virtually identical in tone, save for one rather prominent difference.

UCS's framing holds the promise that a "fuller understanding" of geoengineering technologies could convince society to steer clear of them as a solution. This is an interesting choice of framing. Essentially, UCS argues that taking a peek inside Pandora's Box might be so frightening that we decide to shut the box again, forever. But the only way we will know for sure whether SRM geoengineering is too risky is to try it out, albeit on a scale that would present "negligible physical risks" to the environment.

At present, EDF touts their "early role in the NGO community in promoting governance of climate engineering research." They count UCS, NRDC, and WWF-UK among the EMOs that have joined their effort.

NRDC, who just a few years earlier had seemed to deride the "vener of plausibility" provided by SRM, would write in 2015 that research into SRM was needed

“because manipulating solar radiation is risky and we must increase our understanding of those risks.” However, NRDC’s support for SRM research should probably be described as tepid at best:

For now, think of solar radiation management as the panic room of climate change mitigation. Few people really want to go there, but it’s still tempting to some, especially since our current rate of progress on carbon reduction suggests things could get pretty bad. Let's hope we can turn things around before it comes to that. [Natural Resources Defense Council, 2015, article]

Likewise, UCS’s support for geoengineering research is tempered with talk of “enormous risks and uncertainties,” though this temperance does not prevent them from seeking a “better understanding” of these very same risks and consequences.

Readers of recent UCS blog posts on geoengineering exhibited displeasure with certain aspects of the organization’s framing of the matter<sup>24</sup>. An interesting back-and-forth between Peter Frumhoff, UCS blogger and director of science and policy, and a reader with the screen name “lycophidian” offers evidence of disagreement over the consequences of geoengineering research:

The hazard isn't moral. Research in 'albedo modification' (what Orwellian bullshit!) would of necessity involve 'albedo modification,' unless you are talking about modeling,

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<sup>24</sup> Considerable effort was made during the coding process to distinguish between intraorganizational and interorganizational framing disputes. In the end, however, I decided not to present disputes between content authors and readers as intraorganizational disputes because people who are not members of the EMO may comment. While I only include reader comments that seem to indicate general agreement with the broad goals of the environmental movement, I cannot responsibly assert that the commenters are “card-carrying” members of the EMOs whose discourse is in question. Thus, these disputes are presented as evidence of framing disputes between movement elites and rank-and-file environmentalists in a general sense.

which, you note, would currently be meaningless: ‘Many of the processes most relevant to albedo modification – such as those that control the formation of clouds and aerosols – are among the most difficult components of the climate system to model and monitor.’ That means such a research program, of necessity would involve introducing aerosols on a large scale, which is unacceptable, or on a local scale, which is both unacceptable and meaningless. Beyond that, development of such magic bullet solutions, which inevitably entail unforeseen and detrimental consequences, DO set the stage for their deployment. Their deployment is a political and economic decision, not a scientific one (or we would not have a problem with antibiotic resistant bacteria, neonicotinoids, etc.), will be on the desk for policy-makers, and WILL happen, under one or another administration, precisely because the bipartisan consensus is to place market concerns ABOVE climate change, which means that the type of strategy needed to halt fossil fuel emissions and global warming will not be implemented. In short, we need system change, not technofixes.” [Union of Concerned Scientists, 2015, reader comment]

Here lycophidian calls for “system change, not technofixes,” and argues that research on SRM “sets the stage” for future deployment. Clearly, this reader has a few strong objections to the proposals. Chief among them seems to be that geoengineering would allow “the bipartisan consensus...to place market concerns ABOVE climate change” to continue. In his reply to lycophidian, Frumhoff reframes the need for system change as a possible outcome of increased discussion about geoengineering research:

The concerns you raise are a good example of why any such research beyond computer modeling should be subject to serious public discussion of risks and trade-offs - it may be that ‘unacceptable under any conditions and at any scale’ would be the outcome. But as these are low cost technologies that can be deployed today by virtually any government

(or, for that matter, wealthy individuals), that's a necessary dialogue to have, in my view. It would be unwise to avoid it. And - perhaps - it will help jolt us into the system change that I agree we need. [Union of Concerned Scientists, 2015, reply to reader comment]

### *Conclusion*

As the present chapter has shown, newly-emerging environmental technologies like geoengineering provide particularly useful case studies for researchers interested in examining disputes over prognostic framing. Frame disputes do not only occur in the backstage areas of movement activity. Rather, these disagreements can be readily observed online. If the analysis presented in this chapter has shown us anything, it is that the environmental movement has a highly reticulated discursive field when it comes to geoengineering. Further, the analysis has shown how frame disputes can be characterized through a deliberate analytical process that emphasizes the organizational interactivity of groups as they try to make sense of these controversial solutions to the climate change problem.

The 16 EMOs at the focus of this study employed divergent framings of SRM online over a decade-long span. The vast majority of the disputes coded in this study were prognostic frame disputes. At issue here is the content of the frame – the “what,” so to speak. Since geoengineering proposals were in a nascent stage of development during the period of analysis, the EMOs I analyzed frequently disagreed about how our

climate reality should be changed and what should be done to change that reality. This should come as no surprise.

The relative calm of the first five years (2005-2009) of discourse was followed by a period marked by a good deal of discord (2010-2015). In other words, prognostic frame disputes over geoengineering increased over time. Indeed, nearly all of the interorganizational frame disputes occurred in the latter half of the time period that was analyzed. This may seem counterintuitive. After all, a decade's worth of interpretive labor could plausibly be expected to result in a single, potent, well-defined framing of geoengineering that the entire movement finds palatable. That was not the case for the EMOs analyzed in this study. A possible explanation for this may be that increases in overall discursive activity generate an increased number of frame disputes. In other words, the more opinions there are, the more likely opinions will differ. Another possible explanation involves time. As EMOs had more time to weigh the consequences of prior framings and interact both with their own adherents and as well as with other EMOs, they developed increasingly differentiated interpretations which are reflected in their internet framings. Thus, the observed increase in frame disputes could be the result of refinements generated through these intraorganizational and interorganizational interactions.

Concerns about the unintended consequences of SRM were articulated by many of the EMOs analyzed. For some of the environmental movement, those whom I came to refer to as the "purists," this concern did not change over time. They branded

geoengineering as a “dangerous distraction” from the “real” solutions to the climate change problem. They frequently invoked variations on the precautionary principle – calling for inaction in the face of the scientific uncertainties surrounding SRM. But other EMOs within the movement, those whom I refer to as the “pragmatists,” forwarded the need for SRM research as an alternative interpretation of the precautionary principle. In essence, they asserted that ignorance about geoengineering is a perilous prospect, since not knowing about how geoengineering affects the climate leaves society dangerously unprepared for its inevitable deployment.

In the next chapter, I highlight disputes within and between groups over the manner in which these organizations attempt to affect the interpretation of various audiences. Foregrounding these highly interactive frame disputes reaffirms the methodological utility of the framing perspective by casting frames as the contested and dynamic accomplishments of social movements with observable divisions of interpretive labor. Though it was not initially apparent to me, these divisions of labor can clearly be attributed to at least two distinct collective identities within the environmental movement. As I hope to show in the chapters that remain, the different framings of geoengineering proffered by EMOs are both the root and the result of these identities. In this way the present study may supplement framing research that focuses solely on framing products to the neglect of framing processes.

## CHAPTER FIVE: MINDING MANNER: DISPUTES OVER FRAME RESONANCE

Chapter four documented and analyzed the emergence of a discursive rift over SRM research within the environmental movement over the course of a decade. While some EMOs consistently characterized geoengineering using SRM as a “dangerous distraction” from meaningful climate change actions, other EMOs shifted their framing over time, eventually warning that “ignorance is peril” because of the relative ease with which SRM might be deployed by a single nation or individual. In this chapter I continue to make use of the concept of frame disputes, shifting the analytical focus from prognostic frame disputes toward disputes over how the environmental movement’s geoengineering-related prognoses should be presented in order to maximize mobilization. As the overview of frame disputes in the previous chapter pointed out, these so-called frame resonance disputes were not nearly as numerous as were prognostic frame disputes. While 29.6% of the 142 total intramovement frame dispute comments were coded as frame resonance disputes, these were dwarfed in frequency when compared with prognostic frame disputes<sup>25</sup>.

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<sup>25</sup> As mentioned in chapter 4, some segments were coded as both prognostic frame disputes and frame resonance disputes, producing overlapping codes. Thus, a few segments analyzed in chapter 4 are reanalyzed here to illustrate insights that address resonance rather than prognosis.

Nevertheless, frame resonance disputes over geoengineering are analytically fascinating, not least because the parties involved are ostensibly “on the same team” in most respects. There were two main points of contention relating to frame resonance for the EMOs in this study. The first revolved around whether or not geoengineering should be discussed at all as a solution. The second issue related to resonance centered on definitions of geoengineering, and whether these definitions should be expanded. Ultimately, both issues hinge on how geoengineering should be presented to movement allies, enemies, and bystanders to maximum effect. But to be more specific, the frame resonance disputes documented in the following pages largely revolved around issues of what social movement scholars refer to as “narrative fidelity” (Fisher 1984; Snow and Benford 1988). Narrative fidelity has to do with the extent to which a framing sticks to the cultural script, so to speak. To the extent that EDF and other “pragmatist” EMOs seem to have embraced geoengineering, however reluctantly, this embrace is a noticeable departure from the traditional (i.e., “purist”) narrative about carbon dioxide espoused by the environmental movement. Like prognostic frame disputes, frame resonance disputes play a vital role for the environmental movement. They provide the many individuals that comprise the movement with a framing that aligns with their particular concerns. The environmental movement, like other movements, is not a discursive monolith.

Like the prognostic frame disputes analyzed in the previous chapter, most frame resonance disputes over geoengineering occurred during the last half of the period



analyzed (2010-2015). In fact, the relatively late onset of disputes appears to be even more pronounced in the case of frame resonance than in prognostic framing. Could this be because the pursuit of frame resonance is a higher-order framing task, so to speak? Perhaps. After all, there must be diagnoses and prognoses to represent in order to disagree over representation.

Are concerns about resonance merely the final task in an orderly and linear process of frame refinement? In short, the answer is no. Attention to frame resonance did not attenuate prognostic frame disputes within the movement. This confirms that framing is a recursive endeavor, continually subject to contention and revision. The EMOs in this study continued to engage in prognostic frame disputes about geoengineering well after frame resonance disputes had become evident.

Resonant frames are not constructed in a vacuum, of course. Movement elites want to make issues like geoengineering resonate with various constituencies, to be sure, but it is obviously not up to these elites how issues are received by the targets of framing activity. Indeed, there were a few instances where EMO framings of geoengineering were challenged by one or more readers in the comments section below a blog post. In short, frame resonance disputes seem to be more interactive than prognostic frame disputes, which occurred primarily between movement elites.

## *“The Impossible Is Already Happening”*

In early 2007, Bill Chamedeis’ wrote a post for EDF about geoengineering that invoked the notion of unintended consequences. Reader comments, as was noted in chapter four, generally supported this framing. Two months after Chamedeis’ post, guest blogger Lisa Moore, “a scientist in the Climate and Air Program,” wrote a short post about new developments in climate change research. First on the bulleted list was a scientific paper that, according to Moore, cast SRM as “extremely dangerous” due to the possibility of “a large, rapid ‘warming rebound’ [that] could result if the technology fails or is stopped, especially if there are no parallel efforts to reduce greenhouse gas emissions.” Moore’s summary of the paper is followed by a link to Chamedeis’ April blog post. One reader, however, had a very different take on EDF’s framing of geoengineering. Consider the following comment, posted one day after Moore’s blog post:

We can keep trying to run away from global warming. That is our job now. But I do think is too late. We are 6.3 billion people sharing the world, but do we know how many of us care or how many of us know where we are right now? We may say there is many, many people concerned. Yes, there is. But is it enough? To tell the American or European people to change their lifestyles or to China slowdown the development ‘just’ because the earth is warming up is quite hard. Tibet, North Pole, Andes are melting fast. Can we make some snow, ice or water to put in those places? We have to try the impossible. Because the impossible is already happening. [Environmental Defense Fund, 2007, reader comment]

“Dharma” understands that the audience toward which framing activity is directed matters. The people of America, Europe, and China are not likely to change their ways easily. Clearly, this reader believes that it is futile to hope for meaningful behavioral changes “‘just’ because the earth is warming up.” Dharma believes that it is “too late,” and that not enough people are concerned. The central issue for Dharma is that EDF’s prognostic framing of geoengineering does not align with people’s everyday experiences and cultural understandings. To be clear, Dharma’s comment is evidence of a prognostic framing dispute, but it is also evidence that this reader takes issue with the incongruity between EDF’s framing of geoengineering and how people in America Europe, and China are living their lives. For Dharma, this incongruity renders EDF’s framing of geoengineering ineffective.

The culminating thought – that “we have to try the impossible...because the impossible is already happening” – is frequently invoked in various ways by those who assert that geoengineering, as another reader put it, “is what we are doing now<sup>26</sup>”:

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<sup>26</sup> Up to this point in the study I have deliberately avoided discussing the rather lively “chemtrails” discourse on the internet. I will try to briefly characterize it here for purposes of clarification. In short, the chemtrails discourse seems to consist primarily of a conflation of ideas about weather modification, geoengineering proposals, public health epidemics, and government secrecy. Adherents essentially believe that geoengineering has been going on for years without widespread public knowledge, and that many seemingly-harmless airplane contrails actually contain harmful chemicals – hence the term chemtrails. As recently as 2015, a back-and-forth between two readers of a UCS blog post about geoengineering occurred over one reader’s belief that geoengineering is already happening:

This is very interesting. Not sure why we as a society are still pretending that we are not spraying Aerosol into the atmosphere. Here in Portland we have had increasing use of Aerosols over the past 5-10 years and we are at a point where we have significantly more days without direct sun. I think the recommendations for research, careful consideration and open and transparent dialog are critical here. At this point we are conducting experiments with weather modification and solar reflection without any open research into the long term impacts on plants, animals, and people, not to mention the Aerosols

Given the clear need to apply every productive tool we can to avoid the onset of self-fueling climate destabilization, it is high time the Royal Society launched this study. After all, geo-engineering, on a random basis driven by fossil-fuel profiteers, is what we are doing now... [...] ...I'm appalled by the conduct of Greenpeace, Friends of the Earth, etc. in failing to promote this rational comprehensive approach, let in alone actually opposing it over the years. In this regard their policies are surely directly counter to the intention of their subscribers. Isn't it high time they addressed the issue of climate destabilization with the care that it warrants? [Greenpeace, 2008, reader comment]

The comment above came in reply to the geoengineering-related blog posted in *The Guardian* by Greenpeace-UK chief scientist Doug Parr, which was discussed at some length in chapter four. Readers like Billhook advocate for an expanded definition of geoengineering in the hopes that we can reverse the negative effects of carbon dioxide emissions. If we acknowledge that human actions are already altering the planet, the logic goes, then why not make alterations in a more environmentally positive way?

Billhook also writes that he is “appalled” by EMOs like Greenpeace and Friends of the Earth, since they have not only declined to advocate for geoengineering as a possible solution to the climate crisis, but have been “actually opposing it over the

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that come back down to earth as rain and eventually back into the water system. [Union of Concerned Scientists, 2015, blog post comment by Spennypenny]

The post above led another reader to ask incredulously, “Can someone direct me to peer reviewed papers on these experiments?” “Expl.geo” goes on to reiterate Dharma’s lamentation that “the impossible is already happening,” just not in the way that Spennypenny believes: “I understand that we are conducting climate altering experiments in an uncontrolled manner with our emissions of greenhouse gases. We are also emitting cooling aerosols in the form of other industrial wastes; 50 million tons of sulfur per year I have read; but again, this is not a scientific experiment, rather in support of our consumer society.” What I want to make clear is that adherents to the chemtrails discourse believe that geoengineering is *literally* happening, as opposed to people like Billhook and Expl.geo, for whom the phrase geoengineering “is what we are doing now” employs geoengineering as a metaphor for the negative consequences of carbon dioxide emissions.

years.” Even more remarkably, he accuses these EMOs of carelessness and disloyalty to the wishes of their adherents. Billhook writes that arguments presented against geoengineering by EMOs like Greenpeace “are surely directly counter to the intention of their subscribers.” Like Dharma, Billhook chooses to highlight the incongruity between the organization and its members. Disagreements like these are more than disputes over appropriate solutions to climate change. They are also evaluations of the effectiveness of the framing activities themselves. Billhook is concerned that Greenpeace is not connecting with “their subscribers.”

Another reader echoed Dharma and Billhook’s support for moving the geoengineering discourse forward, noting that more information would be needed before geoengineering could be responsibly characterized as dangerous:

I am confused. Which geoengineering solutions do you disapprove of and why? Oh sorry, why is because they are downright dangerous. So which are, and how so? Difficult to have an informed debate without information. What we need as a planet is the ability to generate a lot of power, especially in the developing world, so that poor people can improve their standard of living. [Greenpeace-UK, 2008, reader comment]

Here Reprobate also takes up the theme espoused by Dharma the year before – albeit with a large dose of sarcasm – that our planet requires “a lot of power...so that poor people can improve their standard of living.” Presumably, only geoengineering will allow us to (if a slight turn of phrase might be allowed) have our coal and heat it too.

Greenpeace, as chapter four initially pointed out, is not concerned about geoengineering research per se, rather, they are concerned with how geoengineering research “gets presented” and “how it might be received and understood by others.” For EMOs like Greenpeace, FoE, and others, geoengineering proposals threaten to spoil the story surrounding carbon dioxide that has long been established and maintained within the movement. The environmental movement’s stance toward carbon dioxide emissions has traditionally been one of obstinate abstinence: If carbon dioxide emissions are the root cause of the climate problem, then society ought to halt those emissions. Geoengineering proposals complicate the story of carbon dioxide emissions. If we can capture, sequester, bury, or scrub carbon dioxide emissions, if there is a viable technological solution to climate change, then it seems quite possible that the incentives for mobilizations focused on carbon dioxide emissions would be reduced.

In a September 2012 blog post, WWF-UK blogger Jon Taylor offered what seemed to be a rather sober assessment of the viability and implications of geoengineering proposals, concluding that “alongside our main efforts to reduce greenhouse gas emissions through smarter use of sustainable energy and through reducing and reversing deforestation, WWF is cautiously supporting research into geoengineering approaches in order to find out what is possible.” Toward the end of the post, he worries that much of the talk around geoengineering seemed to focus on SRM, which he characterizes as a “short-term techno-fix” that may be “easier to visualize by a generation brought up on Hollywood movies” than “a less dramatic and longer-term

effort to clear up our own mess.” It was statements such as these that led UCS to claim WWF-UK among its discursive allies in the intramovement framing dispute over geoengineering.

Four days after writing the post “cautiously supporting” geoengineering research, Taylor added a couple of “afterthoughts.” The first afterthought contrasts largely untested geoengineering approaches with “low-carbon sustainable energy solutions, many of which are becoming increasingly mature industries.” The second portrays geoengineering proposals as fodder for climate change denial. Taylor’s updated framing of geoengineering as a dangerous distraction was now being linked to Norgaard’s (2011) by-now-well-known diagnosis of climate change apathy: “Like the process of grieving, the first stage of most people’s reaction to climate change is denial, and false hopes of a simple geo-engineering solution to a changing climate must not be allowed to feed and sustain that denial, distracting from the very real emissions reduction work that needs to be done.” [World Wildlife Fund-UK, 2012, blog post]

The analytical relevance of this rather concise framing does not lie in the author’s use of familiar dangerous distraction rhetoric to describe geoengineering. Rather, this “afterthought” is included as an illustration of the exhortative quality exhibited by many of the statements that I analyzed that pertains to frame resonance. Were these afterthoughts intended as a clarification of some kind? Undoubtedly. Yet the blog post had generated no online comments from WWF-UK’s online readership.

Nevertheless, consider for a moment the use of two phrases in particular – “most people” and “must not be allowed.” In this context, “most people” refers to the audiences to which geoengineering-related framing activity is directed. Further, “must not be allowed” is an attempt to influence the manner in which movement organizations should attempt to affect the interpretations of these audiences. Both components are concerned with, as Doug Parr of Greenpeace puts it, “how it [geoengineering] might be received and understood by others.” Other EMOs were much more explicit in their attempts to influence the geoengineering discourse within the movement, going so far as to argue that the potential for distraction makes geoengineering a rhetorically taboo subject – that is to say, it should not be discussed at all.

*“We’re Already Playing God, We’re Just Not Doing a Very Good Job of It”*

Alongside, and despite pleas to exclude geoengineering from the climate change discourse, there also came calls to expand the definition of geoengineering. By December 2012, NRDC was among the EMOs who sought to expand the definition of geoengineering to include the unintended consequences of human behavior (e.g., carbon emissions) alongside intentional geoengineering methods. NRDC posted a contribution from science fiction author Kim Stanley Robinson that illustrates this framing. Note the way Robinson anticipates the arguments of other well-meaning environmentalists, reframing geoengineering as a responsibility rather than a risk:



Many people have expressed doubt that the proposals would work, or believe that a string of negative unintended consequences could follow. Merely discussing these ideas, it has been said, risks giving us the false hope of a 'silver bullet' solution to climate change in the near future – thus reducing the pressure to stem carbon emissions here and now.

These are valid concerns, but the fact remains: our current technologies are already geoengineering the planet – albeit accidentally and negatively. [Natural Resources Defense Council, 2012, article]

This framing aligns closely with the notion that “the impossible is already happening,” as one commenter put it five years earlier. By expanding the definition of geoengineering, Robinson seeks to reframe hubris as hope:

...just as technology has aided us in the task of deforesting and draining our wetlands, so too does it now provide us with the capability to do things like *reforest* and *rehydrate*. Thinking about such potential reversals makes me believe the definition of geoengineering should be broadened. Our actions have a global impact; it's good to be reminded of this by giving that impact a name. Were we to take up hybrids and electric cars in great numbers, for example, could that be considered geoengineering? Under an expanded definition, absolutely. Whatever we do as a civilization of seven billion is inevitably going to have a geoengineering effect.” [italics in original] [Natural Resources Defense Council, 2012, article]

Robinson goes on to mention several other examples where environmental actions might “scale up” to the point where they “could be thought of as geoengineering.” Among other examples, he mentions the pursuit of population

stabilization by “promoting women’s legal and social rights,” since “wherever they expand, population growth shifts toward the replacement rate. This particular geoengineering technology nicely illustrates how the word *technology* can't be defined simply as machinery; it includes things like software, organizational systems, laws, writing, and even public policy” [italics in original]. Here Robinson is not only trying to expand definitions of geoengineering, but also of technology itself. It may be the author’s status as a science fiction writer that affords him the ability to envision beneficial climate interventions on a planetary scale. Regardless, some commenters were unimpressed with the way that Robinson contested these normative definitions of geoengineering and technology.

As “spark55155” put it:

The point of engineering is to create some specific effect, based on scientific principles, not hope for some inadvertent effect, which would be an entirely different thing, and not how scientists or engineers work. I therefore don't think geoengineering should be used to describe the inadvertent consequences of human life. [Natural Resources Defense Council, 2012, reader comment]

The remarkable thing about this comment is that this reader does not seem to necessarily disagree with geoengineering as a solution to climate change, or even Robinson’s argument that certain scaled up environmental actions might qualify as geoengineering. Rather, the commenter is dissatisfied with the framing that “inadvertent” geoengineering is already happening, since inadvertent is “not how scientists or engineers work.” To be fair, I doubt Robinson would disagree with this

conclusion, and in the end, “spark55155” attributes Robinson’s logic to his primary occupation as a science fiction author: “...in science fiction, you might be able to get away with...using artistic license, but it would probably further confuse the line between science fiction and science fact.”

Readers may recall from chapter four that a shift in prognostic framing was underway for part of the environmental movement during this period. NRDC was part of this shift in framing, but not everyone was on board. A commenter going by the user name “gmoke” was considerably more resistant than “spark55155” was toward any acceptance of geoengineering as a solution to the climate crisis. Ironically, however, the rather lengthy comment below seems to reaffirm Robinson’s general point despite the use of colorful rhetoric:

Geoengineering is a mechanistic solution to a complex systems problem. It is heroic and, excuse me, big swinging dick technology that will, in all probability, create more problems than it solves. We need to stop thinking like hammers and begin thinking like trees or rivers, flowers or mountains. The fact is there are ecological solutions to climate change that are much more promising with fewer side effects that could be discussed and aren't because geoengineering dominates the conversation. [...] Here is a practical plan to reduce the expected temperature rise by half by 2050. Unfortunately, it isn't heroic technology. It's replacing three stone cooking with more efficient stoves to reduce black carbon, cleaning up diesel engines to reduce tropospheric ozone, and plugging up methane leaks - housekeeping. But housekeeping writ large is what ecological practice is. [...] I wonder why we aren't talking about this instead of space umbrellas and giant hoses to inject sulphur into the stratosphere. Lots we can do to slow and adapt to climate

change but geoengineering is a distraction not a practical solution. [Natural Resources Defense Council, 2012, reader comment]

This comment provides evidence of the potency of the “dangerous distraction” framing employed by EMOs such as Greenpeace or FoE. Another dissatisfied commenter had clearly adopted an understanding of geoengineering that emphasized the “unintended consequences” of climate interventions. In Mark’s words, “...injecting sulfur dioxide into the atmosphere sounds like a disaster waiting to happen. SO<sub>2</sub> is a major contributor to acid rain. Unintended consequences, indeed!” [Natural Resources Defense Council, 2012, reader comment].

When an EMO engages in reframing activities, these efforts take place in the context of already-existing framings. That means that when framings of geoengineering make use of new rhetoric that departs from the original script, resistance is likely to result. Interactions like those between Robinson and his readers are indicative of this type of resistance. For the vast majority of its existence, the environmental movement has largely remained steadfast in its framing of carbon dioxide emissions – the solution to the climate change problem requires the elimination of this “root cause.” Some environmentalists are uncomfortable with the new narrative espoused by EDF, NRDC, and their discursive allies. They view geoengineering as, at best, an excuse to retain our current system of fossil fuel production and consumption.

While EMOs like EDF and NRDC turned toward a different understanding of geoengineering during the latter half of the period of analysis, other groups like Earth

First, Friends of the Earth, and 350.org continued to discuss geoengineering in by-now familiar terms.

In early 2013, Earth First author “Ned Ludd” wrote a contribution to the organization’s newswire to commemorate “the 200<sup>th</sup> anniversary of the Luddite uprisings.” Geoengineering proposals, according to Ned, can be attributed to the “insane” hubris of capitalist technocrats. Instead of a technical assessment of geoengineering proposals, he argues, readers ought to “stand back for a moment, and realize where capitalist technocracy has brought us.” He goes on:

As industrial capitalism has taken us to the point of destabilizing the entire climatic system of the planet, scientists are now seriously proposing to intervene in that system, about which next to nothing is understood. The over-confidence and hubris of technocrats has led them to a point where they feel able to literally play God with the basic life support systems of the entire planet, despite the colossal but incalculable risks that such an enterprise would entail, for the planet and for those other humans, in countries which will have no say in whether these technologies are used. [Earth First, 2013, newsletter]

More importantly for the present chapter, Ned mentions more than once that the best way to mobilize action around “techno-fixes” like geoengineering is by not discussing these proposals at all: “It’s vital that the ecology movement does not even discuss such techno-fixes. We must simply say, ‘No!’ and be prepared to back that up with action.”

This tactic of non-discussion would be continued by EMOs like Earth First and 350.org into the final two years of the study period.

Later that year, in May of 2013, Earthjustice posted an interview with *Wild Ones* author Jon Mooallem, where the interviewer prompted Mooallem with a question about this very same aspect of geoengineering. Is geoengineering a responsibility or a risk?

*Jessica:* Some people think that's sort of a line that you don't cross, while other people point out, look we're already engineering the environment, this would just be a more proactive or purposeful way of doing it, so...

*Jon:* Absolutely. There's a guy named Josh Tomlin who's written about this pretty eloquently. In the book, he says, 'People don't want to play God, but the answer is we're already playing God, we're just not doing a very good job of it.' And his point is, basically we are kind of officially engineering a world that's filled with rats and starlings and kudzu and jellyfish. We're changing the landscape—the animal landscape—but we're not doing it purposefully. And so his point, and others like him who are making this case in the field right now, is we shouldn't necessarily think of our influence always as being negative. It's negative now because we're not actually being proactive about exerting it." [Earthjustice, 2013, interview with author]

This tension would continue to play itself out for the remainder of the study period. If geoengineering is a "dangerous distraction" subject to "unintended consequences," then it should not be considered as a potential solution. Some EMOs even went so far as to say that geoengineering should not be discussed at all. However, if geoengineering is effectively "already happening" because of the negative impacts of society on the environment, then perhaps society can harness that knowledge of our impacts into a positive environmental outcome. Such a global project would necessarily entail global deliberation.

*“The Panic Room of Climate Change Mitigation”*

Alex Hanafi’s blog post for EDF in early 2014 and the reader comments that followed further exemplify the kind of intraorganizational disputes over framing that can erupt over nascent issues like geoengineering. After a few comments from adherents to the “chemtrails” discourse (“...[SRM] is now just a means of asset-grabbing, land clearance and probably population control”), reader Lewis Cleverdon replied with a different opinion on certain aspects of Hanafi’s post. The primary thrust of both the original blog post and Lewis’ reply dealt with governance issues. They generally agreed on, as Lewis put it, “the need for rapid global emissions control” via “both modes of Geo-E.” Though Lewis believes that EDF’s SRM governance initiative is incomplete without a similar, paired initiative for carbon dioxide removal, the relevance of his reply for an analysis of framing resonance disputes lies in his suggestions to EDF about how best to talk about geoengineering.

His concerns in this regard are twofold. First, he lambasts the terms used to describe the two broad geoengineering methods that have been most often proposed. Second, he worries about whether the terms themselves are precise descriptors of the mechanism they describe. Perhaps most remarkable is the comfort with which Lewis dispenses these suggestions about rhetorical strategy:

...the terms used for both modes of Geo-E seem notably suboptimal. Carbon Dioxide Removal is vague in its goal (removal to where?) and of doubtful accuracy – it is the carbon component of CO<sub>2</sub> that is problematic, not the oxygen, and attempting to recover CO<sub>2</sub> rather than carbon multiplies the vast tonnage involved by a factor of 3.664. With

regard to SRM, the aim is to restore planetary albedo by some means to a previous natural level sufficient to offset the warming from anthro-GHGs, and the effort to advance rational discussion of this needs the term 'radiation' in its title like a hole in the head. From this perspective, reviewing the two modes' titles could be very helpful in framing the discussion constructively - I'd suggest that at best they should be termed 'Carbon Recovery' and 'Albedo Restoration.' [Environmental Defense Fund, 2014, reader comment]

While Hanafi (perhaps unsurprisingly) chose not to reply to the chemtrails crowd, he did write a rather lengthy response to Lewis' comment. Unfortunately for the present analysis, his response did not address the rhetorical suggestions outlined above. Instead, Hanafi focused on questions of governance (the topic of his original post). Nevertheless, Lewis' comment shows that he is dissatisfied that the geoengineering discussion was not being framed "constructively," which he attributes partly to the vague and potentially panic-inducing terminology associated with the most well-known geoengineering methods.

It probably worth mentioning that readers like Lewis seem to understand geoengineering proposals quite well, and have found themselves in support of these proposals despite the "notably suboptimal" terms used to describe them. Relatedly, readers of the National Audubon Society's fall 2014 newsletter were treated to an introspective piece about the psychology of climate change, where the author cited research by Kahan, Jenkins-Smith, Tarantola, Silva, and Braman (2015) purporting to



show how “people’s views on climate change are shaped less by their knowledge of the science than by their sense of group identity.” To wit:

‘If you show people there is some way of responding to the problem that’s consistent with who they are, then they’re more likely to see the problem,’ Kahan says. Kahan’s own research has shown that people who might be identified as technophiles are more likely to concede that climate change is a problem if they are given information about possible technological fixes, such as geoengineering. [National Audubon Society, 2014, newsletter]

This summary of the work of Kahan et al. (2015) is offered in the midst of a general discussion of climate change psychology – “cli-psy,” as the author of the blog suggests readers call it. A summary like the one above, when analyzed in the context of an EMO publication, has important implications for how the National Audubon Society’s readers should discuss climate change since it touches on all three core framing tasks. People apparently have an easier time accepting diagnoses if the prognosis aligns with their general worldview. Under this logic, we would expect that EMOs whose memberships are comprised of people who are predisposed toward technological solutions are more likely to support geoengineering<sup>27</sup>. I revisit this episode and its implications for collective identity construction in the next chapter.

The final year of the analyzed time period yielded the highest number of frame resonance disputes. As was noted in chapter four, the late onset of these kinds of

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<sup>27</sup> This might also explain why certain organizations that have traditionally denied the existence or severity of global warming have nevertheless indicated support for technological solutions to the climate problem such as geoengineering. <http://www.yaleclimateconnections.org/2013/10/strange-bedfellows-climate-change-denial-and-support-for-geoengineering/>

disputes may have been partly an artifact of the processual nature of the core framing tasks as well as the inchoate state of geoengineering knowledge within the environmental movement. Indeed, it is impossible to observe any kind of frame dispute until an initial framing has been established and a subsequent framing differs from that initial framing. By the end of the analyzed period, however, discursive divisions within the movement over geoengineering were plainly evident.

Further, the observed increases in frame resonance disputes did not coincide with a decrease in prognostic frame disputes. In other words, the core framing tasks were not approached as a checklist with a linear, beginning-to-end chronology. This was unexpected. The core framing tasks are processual, to be sure, but it would seem that EMOs must also occasionally return to “earlier” framing tasks as intramovement divisions become apparent. For example, groups like FoE continue to argue that geoengineering will “take us in the wrong direction” and “serves as a dangerous distraction from the crucial discussions and actions that need to take place to mitigate and adapt to climate disruption” [Friends of the Earth, 2015, press release]. Another possibility is that old debates resurface as new actors enter the discursive stage.

The National Research Council’s newly-released report on SRM geoengineering initiated a brief exchange between reader Ted Parson and UCS blog author Peter Frumhoff early in 2015. After reading Frumhoff’s take on the implications of the report, Ted offered a few suggestions with regard to frame resonance. Much like Lewis Cleverdon, one of the primary considerations for Ted was to first establish precise

terminology before moving the geoengineering conversation forward. Ted notes that “there’s a lot of useless argument over what to call this, what to call the two major approaches within it – actively messing with the global carbon cycle, or actively messing with the Earth’s radiation balance. For here, I’ll call them ‘carbon stuff’ and ‘sunlight stuff’” [Union of Concerned Scientists, 2015, reader comment]. Ted takes a decidedly different approach than Lewis did, opting for simplicity (“carbon stuff and sunlight stuff”) rather than a more elaborate description (“carbon recovery and albedo restoration”).

While such concerns may seem trivial, readers’ discomfort with the terms used to describe these proposals was shared by the NAS panel who chaired the study in question. Frumhoff summarized the terminological machinations of the recent report this way:

The NAS committee, chaired by Marcia McNutt, recommended avoiding the terms ‘geoengineering’ or ‘climate engineering,’ which imply an engineering precision that is not warranted. Plus ‘geological engineering’ has a different meaning in the context of mining. The committee preferred to define the term ‘climate intervention’ as ‘purposeful actions intended to produce a targeted change in some aspect of the climate.’ [Union of Concerned Scientists, 2015, blog post]

Quite remarkably, the problem for the committee is the use of the word “engineering” to describe something as imprecise as the proposals currently under consideration. This is essentially recognition of the potential for unintended consequences, which is of course a major concern for a large swath of the environmental movement.

Nevertheless, Ted's central concern with the report was what he saw as ambiguity about whether regulations should be agreed to before "outdoor field experiments" begin in earnest:

...[the committee] mostly ducked the hardest and most contentious questions, particularly about governance of research. In particular, they are quite ambiguous on the sharply contested question of whether a new system of regulatory control needs to be in place before the first, smallest outdoor climate intervention experiments take place. My guess is that they will be read, on balance, as saying go ahead and take the next (small) step - outdoor field experiments, including small-scale active aerosol perturbations (both stratospheric and marine cloud brightening). But plenty of people will parse their text to claim they said the opposite, and the text is ambiguous enough to support both readings." [Union of Concerned Scientists, 2015, reader comment]

What is perhaps most interesting about this portion of Ted's comment is that it reveals that both EMOs and individual activists recognize the importance of framing – since much of what is "known" about geoengineering is "ambiguous," it is crucial to worry not about what the committee writes, but rather how "they will be read." Indeed, this interpretive flexibility and consequent contention were sustained features of the geoengineering discourse within the environmental movement across most of the study period<sup>28</sup>.

For Ted, the main problem with the NAS report is that "The text is ambiguous enough to support both readings." He also worries that regulatory decisions about

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<sup>28</sup> Readers might recall Doug Parr's candid admission in 2008 that Greenpeace UK had no issues with the Royal Society's geoengineering report, but rather "how it might be received and understood by others."

geoengineering research might only take place in the United States “rather than immediately engaging foreign counterparts,” which, in his view “is an essential step toward managing the longer-term risks posed by these technologies, most of which are political, not technical.”

Frumhoff replied to Ted’s comment, thanking him while attempting to explain a possible source of the ambiguity – “the wildly differing views of [the] report authors (as they have published elsewhere).” He also acknowledges Ted’s concerns about including foreign counterparts in the conversation about geoengineering research, ending by writing that “A committee charged with recommendations on research governance would surely benefit from participation far broader than scientists alone.” Seemingly on cue, lycophidian then commented that the “development of...magic bullet solutions, which inevitably entail unforeseen and detrimental consequences, DO set the stage for their deployment.” By now, the tension within the movement over how geoengineering should be discussed was being articulated by this rank-and-file environmentalist as a political issue, rather than a technical issue; refusing to discuss geoengineering at all is the only way to ensure that geoengineering never occurs.

Frame resonance disputes erupted over other climate-related issues within the EMOs geoengineering discourse as well. Occasionally these disputes directly disparaged the framing efforts of one particular EMO within the movement. For example in late 2013, Peter Galvin of the Sierra Club’s Rhode Island chapter wrote a blog post about a recent IPCC report, where he notes that organizations within the

movement do not share common standards for environmental improvement. But his example singles out one specific EMO:

I also think we need to all start using the same reference points. [...] The same goes for organizations that continue to set goals in terms of keeping atmospheric emissions of greenhouse gases below x parts per million – for example, 350.org. Just how does this translate into tons of emissions? We're not going to make any progress if we're all speaking a different language. [Sierra Club, 2013, blog post]

For their part, 350.org seems to side with EMOs like the Sierra Club, Greenpeace, Friends of the Earth, Earth First, and other groups who generally oppose geoengineering. Though they did not produce a large amount of discourse about geoengineering during the period of study, a 350.org press release states that “[clean energy] solutions should not include geoengineering, nuclear, and other ‘false-solutions’ that impact poor and vulnerable communities. With clean, just, and renewable energy sources so readily available, getting lost in a discussion about last ditch technologies to save the planet is a dangerous distraction” [350.org, 2014, press release]. So, while these organizations do not seem to disagree about geoengineering, there were a couple of instances like these where framing resonance was contested despite this general agreement. In this case, Galvin takes issue with the difficulty involved in translating environmental standards and statistics across organizations. He views these difficulties as a barrier to progress. Further, he explicitly recommends that organizations within the movement should strive to speak the same language in order to maximize mobilization around environmental issues.

The following year, Bill McKibben's organization also caught the ire of Earth First, who took issue with the goals, or rather lack of goals, articulated prior to the People's Climate March of 2014. Writing in Earth First's online "Journal" feature, Anne Petermann notes that the march was organized by "Big Green NGOs 350.org and Avaaz, who have thrown copious quantities of cash at it." Earth First essentially portrayed the upcoming march as a wasted opportunity, and found occasion to school McKibben on the finer points of social movement strategy.

A couple of readers commented in support of McKibben and 350.org, noting that the environmental movement "should support a range of tactics" and characterizing the "photoshopped" image accompanying the article as "a passive aggressive attempt at trying to ask Bill to lock down to more things." However, one reader adopted the position taken by Petermann, articulating it in even more forceful language:

Marching may be one of the 'tools' in the toolbox, but marching without a clear message and demand is just a fucking parade. I think that is the main message of the post. And, I agree wholeheartedly with it. I get pretty pissed when I read about privileged white guys likening the well-behaved protests they engage in to the civil rights movement. When Bill McKibben marches or the 'President' of the Sierra Club gets arrested at the gates of the White House, it ain't the same as a brown brother or sister facing angry dogs, pissed off rednecks, and racist cops with fire hoses, batons, and bullets. Those fighting in the 60s had a lot to lose and a lot to fear. A march of privileged folks who are on summer break or are taking paid time off work or who, otherwise, don't have to fear for the lives by marching or 'protesting' is not a worthy comparison. That being said, IT IS TIME for the privileged to take action that puts them at risk. It's past time to lay it all out on the line

because that is what is at stake. It may be too late to make any meaningful change (we're passed the 'we're fucked' point), but it's the right thing to do, regardless. So, put away the parade outfits and get the black out. [Earth First, 2014, reader comment]

To a certain extent, the frame resonance disputes I observed seemed to be the inevitable outgrowth of the prognostic frame disputes detailed in the previous chapter. EMOs framing geoengineering as a responsibility generally provided dry technical summaries of the various proposals, arguing that our negative impact on the planet should give us hope that we might be able to reverse course. As one NRDC blogger wrote in early 2015, "For now, think of solar radiation management as the panic room of climate change mitigation. Few people really want to go there, but it's still tempting to some especially since our current rate of progress on carbon reduction suggests things could get pretty bad. Let's hope we can turn things around before it comes to that" [Natural Resources Defense Council, 2015, blog post].

EMOs framing geoengineering in terms of risk frequently dismissed such proposals as "dangerous distractions" rife with the potential for "unintended consequences." These groups tended to adopt a strategy of obstinacy – as one Earth First blogger put it – "It's vital that the ecology movement does not even discuss such techno-fixes. We must simply say, 'No!' and be prepared to back that up with action" [Earth First, 2013, newsletter].



## *Conclusion*

Like prognostic frame disputes, frame resonance disputes play a vital role for the environmental movement. The many different perspectives that they represent provide the many individuals that comprise the movement with a framing that aligns with their particular concerns. I observed a few instances of “boundary framing<sup>29</sup>” (Hunt, Benford and Snow 1994) where EMOs attempted to differentiate themselves from other EMOs in terms of, for example, protest tactics. In short, the reticulated discourse surrounding geoengineering reminds us that the environmental movement, like all social movements, is comprised of multiple and sometimes-conflicting collective identities (Gamson 1997:181).

Movement elites want to make issues like geoengineering resonate with various constituencies, to be sure, but it is obviously not up to these elites how issues are received by the targets of framing activity. Episodes of contentious framing were often aired in the comments section of a number of geoengineering-related publications, generating fascinating back-and-forth commentary addressing the manner in which the movement ought to present its prognoses to its various audiences. In other words, frame resonance disputes seemed to generate more cross-status interactions than did prognostic frame disputes, which occurred primarily between movement elites.

Like the prognostic frame disputes analyzed in the previous chapter, most of the frame resonance disputes over geoengineering analyzed here occurred during the last

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<sup>29</sup> I elaborate on the implications of this research for collective identity construction in the next chapter.

half of the period analyzed (2010-2015). In fact, the relatively late onset of disputes appears to be even more pronounced in the case of framing resonance than in framing prognoses. This late onset could be attributed to the ordering of framing tasks, after all, it is important to remember that there first need to be diagnoses and prognoses to dispute in order to have disputes over representation.

Does this imply that concerns about resonance merely the final task in an orderly and linear process of frame refinement? In short, the answer is no. The observed increase in frame resonance disputes did not coincide with a decrease in prognostic frame disputes. For the EMOs I studied, framing is a recursive endeavor<sup>30</sup> that is continually subject to contention and revision. Indeed, the EMOs in this study continued to engage in prognostic frame disputes about geoengineering well after frame resonance disputes had become evident.

The analytical approach used in this chapter has sought to make sense of how the environmental movement represents geoengineering proposals in their online discourse. In the following chapter, I summarize the findings of the current study as they pertain to collective identity construction processes.

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<sup>30</sup> Another important question to be addressed in the following chapter involves the research of Kahan et al. (2015) on the psychology of climate change, which was cited by a National Audubon Society blogger in 2014. If people tend to more readily accept diagnoses when prognoses align with their worldview, what might this mean for agents of social change?

**CHAPTER SIX:  
FRAME DISPUTES, IDENTITY COLLECTIVES, AND THE SOCIAL  
CONSTRUCTION OF NASCENT REALITIES**

A blow-by-blow account of online frame disputes within the environmental movement over geoengineering is instructive because of the nascent quality of the proposals themselves, and the consequent shifts in framing that occurred within the movement as these organizations came to grips with the implications of these proposals over time. However, the strategy pursued thus far may have obscured certain themes whose sociological implications must now be explored further. The episodic, chronological presentation strategy pursued in the preceding chapters now gives way to another – one that privileges certain findings as they relate to the influence of frame disputes on collective identity construction.

It would be misleading to suggest that all EMOs who regard geoengineering proposals with suspicion – the “purists,” as I will call them – do so because they are Luddites (though this is probably the case for “Ned Ludd” of Earth First). Instead, it seems to me that these EMOs fear a potential Frankenstein’s-monster-run-amok situation. After all, there is by now a fairly robust literature on well-intentioned

interventions of scientists going awry when applied to environmental “management” (for an excellent example, see Scott 1998).

Over the course of the study period, proposals to reflect sunrays or capture carbon that once seemed like “false solutions” or “dangerous distractions” began to be taken seriously by some EMOs as a possible “Plan B” in the face of ever-increasing emissions. This would not be the first time that society has sought recourse in technological solutions for our most stubborn problems<sup>31</sup>. As we are all periodically reminded, politics can be frustrating and fraught with failure. In times that defy the usual political prescriptions, such turns toward hyper-rationality may seem quite sensible. Thus, it is probably unfair to cast EMOs who support research into geoengineering – the “pragmatists” – as mere dupes, or worse, as agents of interests that wish to continue “business as usual” when it comes to carbon dioxide emissions. However, I do think it likely that EMOs become less effective as vessels of protest to the extent that their geoengineering discourse dovetails with discourses of “ecomodernism” (Brand 2009).

To put it another way, the frame disputes documented in the preceding chapters centered on issues of what social movement scholars refer to as “narrative fidelity” (Fisher 1984; Snow and Benford 1988). Since EDF, NRDC, Earthjustice, WWF-UK and other EMOs have embraced geoengineering to varying degrees, this changes the usual framing about carbon dioxide. The ability to block out the sun or reduce the amount of

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<sup>31</sup> If not for the success of the New Deal, the “Technocracy Movement” may well have succeeded in its goal to replace politicians with engineers (Akin 1977; Fischer 1990).

carbon dioxide in the atmosphere decreases the urgency to lower emissions. Shocking though the implications of such a shift in framing may be, these deviations from the script might be expected when situated in the context of previous research on collective identity.

Collective identity is an elegantly named concept, since it captures the tension between the individual and the group. For its part, “identity” implies a kind of coherence that can be readily observed. When a group is successfully identified, it can be appreciated as such for some period of time. A “collectivity,” on the other hand, could be described as the phenomenon of individuals gathering into a group. The combination of the two terms has produced a wealth of scholarship highlighting the claims that groups make about their own characteristics, and by extension, the characteristics of other groups, including allies, antagonists, and bystander publics. As Taylor and Whittier (1995) phrase it, “Making claims about the characteristics of the group is central to the process of identity construction” (173).

Indeed, the “identity work” (Snow and Anderson 1987; Snow and McAdam 2000) that goes into developing a shared sense of “us” (and, consequently, “them”) is a necessary precondition for social movement activity. SMOs like those in this study must find a way to accommodate as many different individuals’ identities into their collectivities as possible, while maintaining some semblance of difference from the dominant society (Taylor and Whittier 1992). This is no easy task.

Likewise, it seems obvious that collective identities must hang together in a relatively coherent fashion for a social movement to be appreciable as such. Yet it is well-known that a movement's constituent organizations engage in "boundary framing" (Hunt et al. 1994; Reger 2008) processes that function to differentiate a movement's groups from one another. This does not mean that well-worn concepts such as solidarity need be discarded in favor of, for example, "fluidarity" (McDonald 2002). Rather, it may be more helpful to think of both solidarity and fluidarity as interactants – just as the organizations themselves are – linked in a continuous dialectic of sameness and difference (Roth 2008). Analyzing frame disputes within a social movement provides a means by which this dialectic can be explored and elaborated.

As a conceptual apparatus, the frame dispute affords researchers a backstage method of sorts – a means by which social movement scholars can observe how movements accomplish the "illusion of unanimity" (Turner and Killian 1972). These kinds of negotiations usually take place away from the judging gaze of movement opponents or the media, and thus require the kind of insider status afforded by participant observation or participatory research methods. This is not necessarily the case for nascent environmental issues like geoengineering. In their public discourse online, EMOs frequently disagreed with other EMOs about the meaning of geoengineering proposals and how they should be framed.

These disagreements show that the environmental movement is not a discursive monolith. There is room under the broad umbrella of environmentalism for many

different kinds of environmentalism – from “dark green” to “bright green,” purist to pragmatist. Some environmentalists are more likely to embrace technological solutions to the climate crisis than others. Others still will never accept such solutions, seeing them as anathema to a harmonious balance with nature. Frame disputes within the environmental movement over geoengineering stem from these disparate, seemingly-irreconcilable collective identities. Frame disputes also reinforce collective identities<sup>32</sup>, serving to further define the discursive boundaries between organizations.

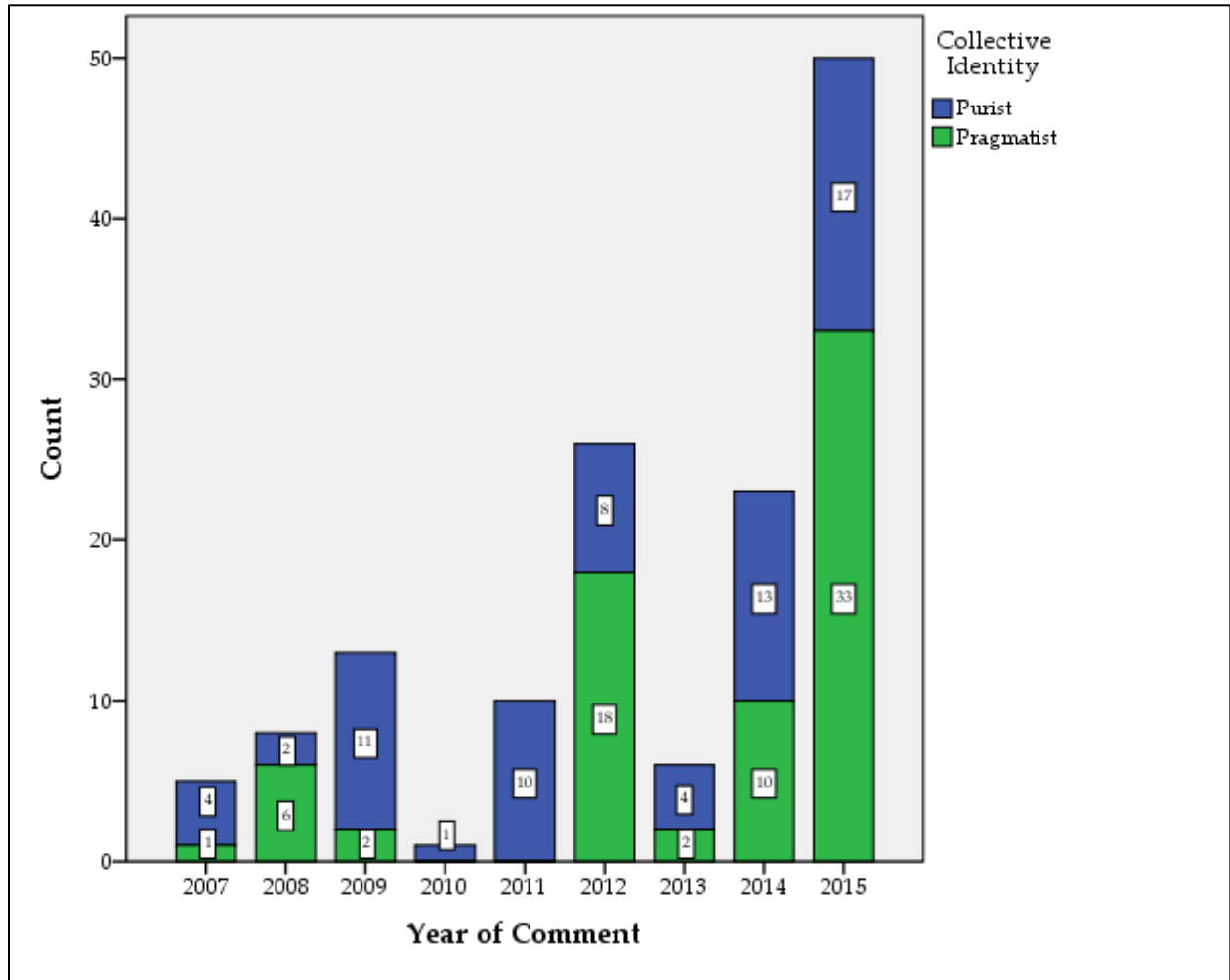
A final round of coding provided a superficial overview of these boundaries. The bar chart below displays a count of the total number of geoengineering-related frame dispute comments per year that were coded as “purist” or “pragmatist.” This gives a rough approximation of the proportion of coded segments produced by each discursive faction in any given year of the study period.

A couple of things are immediately apparent. First, comments exhibiting the purist collective identity were coded in every year that geoengineering-related frame disputes occurred. This was not the case for the pragmatist collective identity – the 2010-2011 period did not include any comments that were coded as pragmatist. Second, though the pattern is a bit uneven, there is an overall increase in the number of purist comments from the beginning to the end of the study period. This was also the case for the pragmatist collective identity, which saw a rather dramatic increase over the latter half of the study period. This second pattern lends support to the idea that the online

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<sup>32</sup> The findings of Kahan et al. (2015) also seem to support this contention, lending empirical support to the familiar truism that proclaims that “to a hammer, everything looks like a nail.”

geoengineering discourse within the movement shifted during the study period for some EMOs.



**Figure 6: Total Intramovement Frame Disputes by Year, Coded by Collective Identity**

If people more readily accept diagnoses when prognoses align with their worldview, as the research of Kahan et al. (2015) suggests, the implications are ironic indeed. What this means is that people who do not currently accept the diagnosis of environmental “purists” – that humans contribute significantly to climate change –



would be more likely to do so if there were a solution that more closely comported with their ideological proclivities. Geoengineering proposals may therefore have at least one additional unintended consequence that has not yet been considered by the atmospheric scientists, geologists, and oceanographers: they just might convert climate change deniers into believers.

### *Identity Collectives*

The divergent representations of geoengineering documented in the preceding analyses point toward a number of conclusions regarding the influence of frame disputes on collective identity construction processes. In addition, the implications of these conclusions provide a mandate for future studies of contentious framing within social movements. I review these conclusions below, and follow up on their accompanying implications in the following, final chapter.

The EMOs in this study exhibited divergent opinions on geoengineering proposals over the course of the study period. Indeed, they sometimes even disagreed over how to define geoengineering<sup>33</sup>. Definitions are powerful sites of framing activity. I view these disagreements not merely as contests of semantic superiority, but rather, as early opportunities to shape the still-forming conversation. As the boundaries of an issue become finite, the groups who make claims about the issue become

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<sup>33</sup> A recent review of the geoengineering literature implicitly acknowledges the contested nature of geoengineering definitions by defining geoengineering as “an *unbounded* set of heterogeneous proposals for intentionally intervening into the climate system to reduce the risks of climate change” (Boettcher and Schäfer forthcoming) [emphasis added].

distinguishable through their discursive productions. The character or collective identity of the group is manifested in these interactions.

To the degree that disagreements over discursive boundaries disrupt established convention, those who would maintain such boundaries are compelled to hold the line. These processes described above could aptly be characterized as “boundary work” practices (Hunt et al. 1994). More importantly for the present project, however, is the point that the boundaries that result from this work serve to delineate the terms of nascent reality, providing even novel social constructions with familiar vocabularies that prime interactants to act much as they have in the past.

Some organizations within the movement are more accommodating toward technological solutions than others. The collective identity of these groups emphasizes a pragmatic approach to environmental issues. Other environmental organizations abhor “technofixes,” and yet both find common cause within a single, identifiable social movement. How is this possible?

In essence, it is their shared interest in preserving some semblance of environment quality that binds them together. Fortunately for the movement, this discursive flexibility likely bolsters actual and potential membership, clearing the space that is necessary for people to choose alternative paths toward the same goal. These alternative paths present themselves to the social movement scholar as collective identities, but to the activist they are more than mere labels. Collective identities provide individuals with a cultural touchstone that shapes their framing activity. In

turn, this framing activity alters collective identities by reinforcing, shifting, or obliterating discursive boundaries.

Indeed, when it comes to geoengineering proposals, it may be more useful to regard the environmental movement as an identity collective – a collection of disparate collective identities – rather than as possessing a dominant, unified frame that the movement can be expected to coalesce around. This kind of discursive flexibility holds a great deal of utility for social movements, and may help explain the durability of the environmental movement. In fact, this type of flexibility may be necessary during contentious episodes of nascent reality construction.

## CHAPTER SEVEN: CONTRIBUTIONS, LIMITATIONS, AND FUTURE DIRECTIONS

This dissertation makes a number of useful contributions to the social movement research literature that deserve a final mention. Most of these contributions deal with the novelty of the topic, but some also have to do with the novel combination of concepts used during the course of the study.

To the best of my knowledge, this dissertation contains the first review of research on frame disputes within the environmental movement, including a delineation of the similarities and differences between frame disputes and framing contests. Thus, the study is novel in the sense that it outlines, however loosely, a framework for the understanding of contentious framings in social movements.

Similarly, geoengineering proposals are themselves novel, and have received relatively little attention from researchers as a consequence. This study adds to the growing body of knowledge on these nascent proposals, showing how one segment of society makes sense of this ontologically unsettled situation. The analysis presented here made use of an original dataset compiled from a variety of online sources.

In seeking to examine the influence of frame disputes on collective identity construction, this dissertation combines concepts which have heretofore remained separate, showing how they inform one another in dialectical fashion. In short, it seems that framings influence collective identities, and collective identities influence framing. As Scott and Lyman (1968) put it, "Every account is a manifestation of the underlying negotiation of identities" (58).

Studying frame disputes about geoengineering adds to our understanding of a relatively understudied aspect of framing within social movements (Lichterman 1995; Krogman 1996; Gray 2003; King 2008; Resnick 2009; Walker 2009; Wahlström et al. 2013). Further, the present study may contribute, however modestly, to the growing body of recent qualitative research that shows how discourse surrounding inchoate environmental technologies like climate engineering generates strong feelings of support, opposition, and apprehension (Hulme 2008; Bellamy and Hulme 2011; Sikka 2012; Macnaghten and Szerszynski 2013; Mercer, Keith and Sharp 2011; Pidgeon, Parkhill, Corner and Vaughan 2013; Scholte, Vasileiadou and Petersen 2013; Luokkanen, Huttenen and Hilden 2014).

A great deal of time, effort, and resources has been spent constructing the ideas and language people use to discuss carbon dioxide, the effect that too much of it in the atmosphere can have for our environment, and what should be done about it. Most of these framing efforts surrounding carbon dioxide have been aimed at lowering the amount of carbon dioxide that we emit into the atmosphere. However, geoengineering

proposals might portend a fundamental reorientation toward carbon dioxide. If we can capture, sequester, bury, or scrub carbon dioxide emissions, if there is a viable technological solution to climate change, then it seems quite possible that incentives for certain kinds of political mobilization will be reduced. In a sense, then, this dissertation documents another longstanding concern in the study of social movements, namely “the struggle between romantic and pragmatic adherents to a movement” (Turner and Killian 1972:255).

There are many things that the scientific community and the public consider acceptable or known facts. Studying geoengineering as a technoscientific artifact-in-the-making, before it has become what sociologists of science refer to as a “black box,” prevents this kind of obduracy. Inchoate environmental technologies like geoengineering offer environmental movement researchers the opportunity to observe EMOs as they negotiate over these proposals, allowing us to generate further insight into the dynamics of social movement framing processes and intramovement framing disputes. Such studies may prove useful for other technoscientific environmental controversies as well since EMOs depend heavily on the products of scientific activity in their articulations of shared grievances (Yearly 1994). There is still much to be learned about the way that framing disputes influence grievance articulation and representational tactics – for example, it remains unclear whether this intramural infighting tends to improve or undermine the overall effectiveness of the movement and its constituent organizations.

Finally, though Benford's (1993) analysis did not necessarily suggest that certain types of frame disputes may be more common to movement coalitions than others, one might reasonably expect that prognostic disputes and frame resonance disputes would be more common within movements than diagnostic disputes. Diagnostic disputes are common, of course, in the wider discursive field within which SMOs seek to promote the primacy of their issue over other social problems. But within a movement we should expect that most adherents largely agree on the fundamentals – the nature and source of the problem.

### *Limitations*

While I did not anticipate (nor can I now address) all of the shortcomings of my research, a number of limitations deserve special mention. Certain of these are obvious, others less so. Generally, these limitations include issues with case selection, concept application, research context, and analytic procedure.

The groups included in the study are a decidedly non-representative selection of EMOs whose perspectives likely do not correspond proportionally to the composition of the discourse across the entire environmental movement in the United States. I sought to gather geoengineering discourse from a wide range of EMOs. Thus, I made attempts to consider the relative prominence, and tactical and discursive repertoire of the organizations as they were added to the study.

My choice to examine EMO framings of geoengineering proposals, while purposive, also may have artificially exaggerated the discursive differences between these organizations. My desire to interrogate the concept of frame disputes (a limitation in itself, as I discuss in Chapter 3) drove my choice to examine EMO framings of geoengineering proposals. The uncertainty surrounding these proposals, I wagered, would produce divergent framings as the organizations that make up the movement sought to make sense of the proposals during the early stages of their development and dissemination.

So, while I intentionally examined EMO framings of geoengineering to analyze what happens in such unsettled situations, this strategy may have unintentionally created the impression that I observed what one might characterize as a significant, sustained discursive schism between these organizations. I did not. After all, each of the organizations in this study is comprised of people who consider themselves environmentalists. None of the EMOs in this study explicitly stated that they supported research into geoengineering to continue “business-as-usual,” as they might put it. Further, the discourse produced within the movement over geoengineering proposals is relatively miniscule when compared to the discourse generated by other environmental issues.

Contextual considerations also affected the study. As Chapter 3 detailed, the online setting of the study imposed certain limitations. Further, the interaction of the online setting along with the chosen time period likely played a role in the observed



increases in geoengineering discourse. While the internet had been in popular use for some time prior to 2005, the practice of blogging began in earnest around this time, coinciding with the advent of what is sometimes referred to as “Web 2.0.” This era in internet usage saw increase in dynamic, socially-produced content; this characteristic is usually contrasted, of course, with Web 1.0 where static content was created to be consumed by users. In short, the data collection strategy employed here may have been better suited to the Web 1.0 era rather than the Web 2.0 era of internet usage.

The time period chosen for the study, 2005-2015, coincided with a general increase in geoengineering discourse online (see Figure 3 in Chapter 4). As I mentioned in Chapter 3, scientists like Crutzen (2006) and advocates like Brand (2009) were beginning to seriously explore geoengineering proposals as technologies of last resort, and were asking environmentalists to consider their potential as carbon emissions continued to rise. Though it was my impression that the environmental movement did not discuss geoengineering proposals online to any great extent until shortly after the publication of Crutzen’s (2006) paper on the subject, it is quite possible that EMOs produced discourse on this topic prior to 2005, or at the very least discussed other issues related to controversial environmental technologies that may have provided more context about these organizations’ collective identities.

Another thing should be mentioned about collective identity with regard to analytic procedure. Sorting comments into two broad categories (i.e., “purists” and “pragmatists”) undoubtedly did a disservice to some of the intricacies of the

geoengineering framings I observed. There are many more nuanced takes on geoengineering proposals within the environmental movement than is suggested by the dichotomy employed here. Collective identity was an emergent concern in this study, however, which I can only hope explains the somewhat superficial quality to this final round of coding.

Taken together, the limitations just outlined preclude any pretenses toward generalizability. It is my hope that any grandiosity with regard to the conclusions reached will be attributed by the reader to the larger-than-life issues at play here, rather than any claims that the organizations, time period, subject matter, setting, and so on are representative of anything other than the context-specific situations documented in the preceding pages. Limitations notwithstanding, I conclude this dissertation by suggesting an outline for future research into related topics and concepts.

### *Future Directions*

This dissertation can be added to other research on perceptions of geoengineering that show bifurcation between supporters with optimistic beliefs about science, and detractors who balk at such manipulations of nature. As Mercer, Keith, and Sharp (2011) point out, “public opinion on SRM is strongly contingent on how, where and in what context SRM is discussed” (9), providing further justification for research into the framing of newly-emerging environmental technologies like geoengineering.

Jamison's (2006) call to consider the relations between environmental science and the environmental movement remains in force in my opinion, and has perhaps increased in relevance in the decade since it was made. This connection should be examined in new contexts; fortunately, many other environmental technologies would be attractive candidates for such research. The phenomenon of sea-level rise and associated coastal preservation and remediation technologies are but one of the intriguing possibilities that come to mind.

Sociologists have often sought to answer questions that uncover how people anticipate and act on predictions about the future. Futures are made through deliberative, formalized scientific processes, and they are also articulated through informal epistemological channels. Though such questions were not pursued directly in the preceding pages, the data gathered for the present study may be able to help shed light on how different framings of our environmental destiny are legitimized or delegitimized. What kinds of environmental management are deemed credible? What kinds of environmental management are inappropriate?

Relatedly, frame resonance disputes sometimes hinged on whether geoengineering proposals should be discussed at all. This strategy begs the question of whether predictions about future climate scenarios foreclose certain opportunities and nourish others. Put another way, can environmental utterances produce environmental realities? Frame disputes over geoengineering proposals complicate notions of

sustainability, stewardship, resilience, and other contemporary discussions about the appropriate balance between people and the environment.

Future research into frame disputes should examine an entire series of contentious framing episodes. To be more specific, identifying the sources of change in the trajectory of a frame dispute would be useful. What are the moments that alter the career of a frame dispute, or end it? As frame disputes have been shown to influence collective identity construction processes, this strategy may have the effect of identifying important aspects of these mechanisms while helping to isolate relevant temporal and contextual factors that sustain them.

### *Conclusion*

I was near the end of the research presented in the preceding pages before I became aware that frame disputes could serve as useful conceptual conduit and alternative means of exploring collective identity. Essentially, I view frame disputes as carriers of collective identities. Frame disputes over geoengineering show the remarkable discursive breadth of the environmental movement – even fundamental prognoses about carbon dioxide emissions are subject to dispute among allies. Collective identities are not unassailable. Quite to the contrary, they are very fragile, and it is their fragility that renders them worthy of study.

As geoengineering research and governance initiatives continue in the coming years, the balance of the conversation is likely to shift from questions of plausibility toward concerns about ethics and unintended consequences. This shift cannot occur soon enough, in my view. The frontstage discourse reviewed in the present study exhibited a startling degree of ignorance about the potential for geoengineering schemes to produce environmental injustices. Though these concerns received brief mention in certain quarters of the movement, future deliberations about geoengineering ought to take these issues more seriously, as the impacts of these decisions will undoubtedly migrate across national borders.

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**APPENDIX A:**  
**OVERVIEW OF ENVIRONMENTAL MOVEMENT ORGANIZATIONS**

*350.org (350.org)*

According to the “Our History” section of their website, this organization “was founded by a group of university friends in the U.S. along with author Bill McKibben, who wrote one of the first books on global warming for the general public.” 350.org derives its name from an atmospheric carbon dioxide threshold that has since been surpassed. Reducing atmospheric carbon dioxide below this threshold of 350 parts per million (ppm) is important, according to 350.org , “if humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted.” The group organizes “coordinated days of action” linking together people from “over 188 countries” in their environmental campaigns.

*The Climate Reality Project (climaterealityproject.org)*

Former U.S. Vice-President Al Gore is the founder and chairman of the Climate Reality Project. Organized following the release of *An Inconvenient Truth* in 2006, the mission of this organization “is to catalyze a global solution to the climate crisis by making urgent action a necessity across every level of society.” The “many ways”

people can help include “watching a video that expands your awareness of the issue, sharing a post, signing a petition, reaching out to your leaders, donating to initiatives, wearing our gear, attending a training, or organizing a climate presentation in your community.”

*Earthjustice (earthjustice.org)*

Once known as the Sierra Club Legal Defense Fund, the attorneys at Earthjustice “wield the power of law and the strength of partnership to take on critical environmental issues and bring about positive change.” Originating in a lawsuit over the Walt Disney’s plans to develop a ski resort in a Sierra Nevada valley called Mineral King, the organization today claims to have “more than a hundred attorneys in offices across the country” representing clients free of charge in over 400 active environmental cases.

*Earth First (earthfirst.org)*

According to their website, Earth First “was named in 1979 in response to a lethargic, compromising, and increasingly corporate environmental community” and “takes a decidedly different tack toward environmental issues.” Earth First claims that they are “not an organization, but a movement” and tout the unity they achieve through diversity: “from animal rights vegans to wilderness hunting guides, from shrill

voices to careful followers of Gandhi, from whiskey-drinking backwoods riffraff to thoughtful philosophers, from misanthropes to humanists there is agreement on one thing, the need for action!”

*Environmental Defense Fund (edf.org)*

The “evidence-based advocates” at the Environmental Defense Fund seek to build support for progress on environmental issues across a broad range of allies — “from farmers to Fortune 500 companies.” They claim to be “one of the world’s largest environmental organizations, with more than 1.5 million members and a staff of 550 scientists, economists, policy experts, and other professionals around the world.” Headquartered in New York City, the group prides itself on “practical solutions” to “urgent threats” that are “guided by science and economics.”

*Friends of the Earth (foe.org)*

“Born” in 1969 in the aftermath of the Santa Barbara oil spill, Friends of the Earth is “a global network representing more than two million activists in 75 different countries.” Their U.S. members pressure national and state legislators and work with community groups from their offices in Washington, D.C. and Berkeley, CA “to defend the environment and work towards a healthy environment for all people.” Friends of

the Earth claims to focus on “what needs to be done, rather than what is seen as politically feasible or politically correct.”

*Greenpeace (greenpeace.org/usa)*

Greenpeace was founded in 1971, after activists leased the *Phyllis Cormack* and sailed for Amchitka Island to protest nuclear tests off the coast of Alaska. The group claims that the “250,000 members in the United States and 2.8 million members worldwide provide virtually all of [their] funding through individual contributions.”

*National Audubon Society (audubon.org)*

The National Audubon Society was founded in 1905, following the establishment of several state-level bird conservation groups over the previous decade. In 1945, “Audubon magazine [sounded] the first alarm about the hazards of DDT.” This advocacy culminated in a 1972 ban of the chemical insecticide after successful campaigning by the National Audubon Society and the Environmental Defense Fund.

*Natural Resources Defense Council (nrdc.org)*

Headquartered in New York City, the Natural Resources Defense Council was “founded in 1970 by a group of law students and attorneys at the forefront of the

environmental movement.” The organization claims “more than two million members and online activists with the expertise of some 500 scientists, lawyers, and policy advocates across the globe.” Their style of organizational self-description is very similar to that of the Environmental Defense Fund and other EMOs in the study in that a claim about the size of the group’s membership is supplemented by a statement about the number of experts that the group employs.

*The Nature Conservancy (nature.org)*

The Nature Conservancy “addresses the most pressing conservation threats at the largest scale.” Their website claims that the organization has conserved 120 million acres since their founding in 1951. They claim over 1 million members and a “diverse staff, including more than 600 scientists.” As for tactics, they expressly mention in the “Vision” section of their website that they use “a non-confrontational, collaborative approach.”

*National Wildlife Federation (nwf.org)*

The National Wildlife Federation’s website makes frequent mention of the broad appeal of the “conservation ethic” which “has long united Americans from all walks of life and political stripes.” The organization bills itself as “a nationwide federation of state and territorial affiliate organizations and nearly six million members and

supporters across the country,” which makes it easily the largest organization included in the present study.

*Rainforest Action Network (ran.org)*

Based in San Francisco, the Rainforest Action Network “envisions a world where each generation sustains increasingly healthy forests, where the rights of all communities are respected, and where corporate profits never come at the expense of people or the planet.” They seek to accomplish this vision using a combination of “education, grassroots organizing and non-violent direct action.” In existence since 1985, they claim to have pioneered the “corporate campaigning model,” explaining that “we don’t target one company at a time. We target whole industrial sectors.”

*Sierra Club (sierraclub.org)*

The Sierra Club claims to be “the nation’s largest and most influential grassroots environmental organization – with more than two million members and supporters.” Founded by conservationist John Muir in 1892, the organization has 64 chapters across the United States and a 15 person board of directors that is elected by Club members. The group lobbies, pursues legislation and other legal action, and seeks to raise public awareness around various environmental issues.

*Union of Concerned Scientists (ucsusa.org)*

Students and scientists at the Massachusetts Institute of Technology formed the Union of Concerned Scientists in 1969, dismayed about the Vietnam War and the Cuyahoga River fire among other issues. The organization's founders drafted a statement in "calling for scientific research to be directed away from military technologies and toward solving pressing environmental and social problems."

*The Wilderness Society (wilderness.org)*

As they state on their website, "The Wilderness Society has led the effort to permanently protect nearly 110 million acres of wilderness in 44 states" since its inception in 1935. They claim to be "the leading American conservation organization working to protect our nation's shared wildlands." Their current campaign seeks to prevent the sale of federal wildlands in 19 states "to the highest bidder."

*World Wildlife Fund (worldwildlife.org)*

The World Wildlife Fund claims to have "more than six million members" who contribute to their goals of nature conservation and biodiversity preservation. The organization formed in 1961 because "the expertise to protect the world environment existed, [but] the financial support to achieve this protection did not." Their website has a timeline listing various conservation victories over the last several decades.