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CRITICAL ENVIRONMENTAL SECURITY: RETHINKING THE LINKS BETWEEN NATURAL RESOURCES AND POLITICAL VIOLENCE

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CHAPTER 4
CLIMATIC SECURITY AND THE TIPPING POINT CONCEPTION OF THE EARTH SYSTEM

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> "Now it is time for us to rise to our newest and biggest challenge: to fight the first great war of interdependence, the struggle for climate security."[1]

> "From this day forward, the words 'climate change' and 'national security' will be forever linked."[2]

Abrupt and dangerous climate change is now a significant concern for many people, and the recent and very rapid reconfiguration of some mainstream scientific, environmental, regulatory and security discourses by claims of increasing climatic instability deserves close attention. Perhaps not surprisingly, the notion of an insecure or unstable climate system is itself a shifting and ambiguous construct, one assembled from diverse cultural and scientific elements, and invested with multiple meanings depending on the context and purposes for which it is invoked. These elements are sometimes of ancient origins, and marked by different histories and debates, as suggested by Mike Hulme, Simon Dalby, Jon Barnett, Max Boykoff and others. Nothing is gained in over-simplifying this point. Yet, the current discourse on climatic instability is quite new in many respects, at least in the form that underpins the surge of interest in 'climate security' shown by Western intelligence, security and military planning agencies. It is the relationship between recent efforts to re-figure popular notions of climate change – as abrupt, as tipping point laden, as dangerous, as a security issue – and the national security interests of the US and UK governments that are explored here.

One obvious and popular manifestation of this 'climate security' phenomenon is the journalistic discourse on 'climate wars.' We can find Friends of the Earth claiming, "Warming Means War," or Gwynne Dyer hypothesizing nuclear war as a consequence of climate change.[3] In the sober words of Jon Barnett, such discourse "is excessively general, and poorly if at all informed by evidence."[4] Hulme makes a similar observation regarding the most widely disseminated claims, which sensationalize the association between climate change and violent conflict by placing it in exceedingly simple and 'deterministic' frameworks.[5] Barnett and Hulme are right to question the authority accorded to climate war projections, and to worry that security agencies are seeking to appropriate public concern over climate change on behalf of the inequitable and dangerous reconfiguration of geopolitical space.

However, while we might quickly decide that the current fascination with climate wars is unfortunate, some argue that this work represents only a partial snapshot of the emerging climate security discourse.[6] If we concentrate on the more sensational claims regarding violent conflict in studying the connection between security and climate change, we obscure other ways that military, intelligence and security agencies are prioritizing ideas of climatic instability to reconfigure institutional and cultural sites of environmental concern.

In order to understand how this works, we must avoid facile conceptions of the relationship of security and scientific work on environmental change. In particular, we must abandon the idea that climatic instability is a fictional or ideological fabrication of paranoid national security agencies or worry-wart environmentalists, one bereft of scientific merit or impossible to legitimize through scientific means.[7] The idea of climatic instability – and the associated terminology like 'tipping points,' 'irreversibility,' 'abrupt change,' 'rapid change,' 'flickering,' 'lurking monsters,' 'ornery beasts,' etc. – is, if you will permit the phrase, 'good science.' It is not, however, environmental science as it is usually conceived. It is not wholly funded via close contact with the characteristic environmental issues of the last 40 years; it is not usually discussed in terms of 'limits to growth' or precautionary perspectives that often shape climatic inquiries; and it has not shaped – or been shaped in turn – by the usual policy and media processes, which are sites where environmental concerns are especially pronounced. Intergovernmental Panel on Climate Change (IPCC) assessment reports, for example, have not prioritized such science or the notion of climate 'surprises' it seems to entail. In this respect, we might say (quite tentatively) that it is an as yet 'un-socialized' scientific perspective; environmentalist concerns, policy demands, or democratic traditions of social change have not strongly shaped its public expression.

The demand that climatic and environmental policy be reconfigured around identifying safe distances from dangerous tipping points in the earth system should command our close attention – and critical appraisal. As fundamental planetary systems become objects of management and governance, and as early warning systems for tipping points are proposed, we need to figure out whether governments interested in particular forms of securitized space are marking the contexts for producing, disseminating and using abrupt climate change science in non-trivial ways. In this respect, the danger of the security interest in climate change is its capacity to produce truths consonant with specific visions of geopolitical order, not the penchant or ability to circulate untruth, manufacture public fear, or distort science.

The argument forwarded here requires a closer look at the production and communication of scientific knowledge. I'm hypothesizing that the contemporary interest in climatic instability is shaped by security agencies drawing selectively on scientific discourses of climate change in order to amplify the elements of this science that comport well with their geopolitical visions of the world. In this respect, I am building on the observation that just as new images of catastrophically abrupt climate change have achieved popular salience in the last five years, so too we have witnessed strong interest in reframing climate change as a security matter in the United Kingdom and United States. Of course, the relationship could be mere coincidence. Or, more likely, environmental lobbyists may simply be casting their framing strategies widely to build a coalition capable of motivating environmental regulation in the usual manner. But why are environmentalists only now emphasizing abrupt

climate change, and why only now have they successfully interested those most attracted to national security perspectives? I speculate in the pages that follow that there are other reasons for the concomitant rise to prominence of images of climatic catastrophe and security concerns, namely, that the earth system science underwriting efforts to alter our view of climate change has refused the usual environmental framings to emphasize security concerns. As a result, the wide range of actors invested in security perspectives have encouraged and amplified the security implications of this science to displace the conception of climate change as an environmentalist issue in key political and public policy forums.

Before proceeding, an important qualification is in order. It should go without saying that the full range of relationships between national security institutions and mainstream environmental institutions – which are varied and complex – cannot be captured by the narrow interest of this manuscript.[8] Instead, I focus on one of the more pronounced and interesting trend, which is the potential displacement of the environmentalist framing of climate change by security discourse in significant political and policy forums.[9]

The paper proceeds as follows. In the first section, I discuss how critical discourse analyses of climate change communication help explain the emergence of public and political concern with climate security. Building on the tradition[10] of analysis established by John Dryzek, Ron Greene, Maarten Hajer, Karen Litfin, Sheila Jasanoff, Anabel Carvalho, as well as Max Boykoff, Mike Hulme, and their respective collaborators, we can account for and explain the prominence of specific perspectives in the "epistemological hierarchy" of climate change discourse.[11] In the second section, I describe the popular emergence of the 'tipping point' vision of earth system change and its implications for climate security and global governance. In conclusion, I situate this argument among attempts to engage more broadly questions of climate security.

Epistemological Hierarchy and Climate Change Communication

There are many ways of depicting the earth system and climatic change. The dominant way of discussing different depictions is through the concept of framing, which argues that in the communication of a complex phenomenon certain aspects are emphasized in order to guide perception, to suggest responsibility, and to direct preferences regarding the underlying problem and best solution.[12] The image of a stable and resilient earth system characterized by negative feedbacks and self-correcting mechanisms, for example, is often drawn upon to dampen concern with industrial pollution – anthropogenic carbon dioxide (CO2) emissions or dumping of toxic waste in the ocean is of minimal concern in discourses governed by this conception of the earth. The use of this enduring image of the earth system in contemporary politics is pronounced. It is notable, for example, that perhaps the most prominent climate skeptic, Richard Lidzen, repeatedly emphasizes the role of negative feedbacks as self-correcting mechanisms in his treatments of anthropogenic climate change as a trivial concern.

More recently, we have witnessed the rise of a competing conception of the earth system, one closely allied with concerns over catastrophic climate change. In this view, our current period of

relative stability is the exception, not the norm. Our belief in stable environmental systems characterized by incremental, gradual and manageable change is derived from our experiences with a terribly minute slice of earth systems change, and this experience is by no means the norm. In fact, if examined in geological time scales and through paleo-records, the most significant forms of environmental change are better characterized as abrupt, rapid, flickering, cascading, threshold-based, tipping, irreparable and irreversible on human time scales. There are monsters and ornery beasts in the climate system.[13] In these discussions, the role of positive feedbacks is emphasized to suggest that climate change is potentially much worse than previously anticipated.

In the last five years, this tipping point conception of the earth system, as I will call it, has been intermixed with the catastrophic framing of climate change and this 'compound' has gained extraordinary salience in a range of cultural sites, most notably the mainstream news media in the United States and UK (where the interest in climatic security has also emerged). There is some debate regarding the novelty of this framing for climate change: some argue that the tipping point concept is merely 'old wine in new bottles,' whereas others propose that the ecological and complexity science take on abrupt climate change is a novel perspective on matters.[14] The situation is made complex by the tendency to retrospectively re-describe previous research in terms of 'tipping points.' One thing is clear: the contemporary salience of such views of the climate system *is* new. As a consequence, this image of an unstable, insecure climate system has de-legitimized or even pushed aside competing understandings of environmental and climatic change, and the discursive availability of this new image has authorized actors and institutions not commonly involved in defining the terms of debate for climate change to make claims regarding the management and governance of global spaces. It is this feature of climate discourse – its cultural politics if you will – and the concomitant rise in 'climate security' interest during this five-year period that interests me most in this paper.

The notion of an 'epistemological hierarchy' is helpful in conceptualizing how the competitive jostling among framings of climate change works. In the words of Saffron O'Neill and her collaborators, "[t]here is an emerging recognition that different institutions promote certain types of climate change knowledge production, whilst other types are marginalized; a situation we term an 'epistemological hierarchy.'"[15] In this view and in the earlier work of Mike Hulme, climate change discourse is a complex and heterogeneous field of struggle among different disciplinary perspectives and framings, and we can study how different ensembles of knowledge practice and institutional imperative coalesce in a framing strategy designed to gain public, political and policy influence.

We can use discourse analysis to establish the state of play among frames, knowledge practices and institutions, and we can track the reconfiguration of the hierarchy over time and in a range of cultural sites. In a series of important studies, Max Boykoff has illustrated the way climate change skeptics have re-framed climate science as a "scientific debate" in prestigous US news media.[16] In my previous research, I signalled the effort of researchers, the US Center for Disease Control (CDC), Health Canada and the World Health Organization (WHO) to redefine climate change as a 'public health' issue, and I suggested new saliency for discussions of climate change and human health as the vehicle for advancing such frames in mainstream news media. In both cases, prestigous news media were the vehicle through which institutional claims-makers sought to reconfigure the epis-

temological hierarchy for climate change discourse.

The new proliferation of the 'abrupt and catastrophic climate change' frame is evident in several cultural sites of interest. In their study of the 2009 Copenhagen Congress – a precursor to the Conference of the Parties (COPS) meeting in November 2009 – O'Neill et al. illustrated the dominance of geo-scientific frames of climate disaster. Although a range of different frames were made available during the conference, O'Neill et al. noticed that the media strategies of conference organizers emphasized "geoscience research through a catastrophic frame," and they suggested this preference was reflected in media coverage of the event.[17] Other research has found the same preference in UK and US print media coverage of climate change more generally. In appraising the trend toward catastrophic scenarios in climate change discourse, they offer this conclusion:

> Catastrophic reporting reinforces the hierarchical pre-eminence of the geosciences and, conversely, the knowledge claims of the geosciences provide legitimacy and credibility to catastrophic framing. This serves to reinforce the message of climate change as an unfolding, almost pre-determined, disaster.[18]

It should be evident from this discussion that media are a site where framing competitions play out as well as a means through which the 'epistemological hierarchy' is re-figured across a whole range of sites, including IPCC reports, COPS meetings and policy deliberations, UN Security Council debates and other realms.[19] The main difficulty is not illuminating media influence – or efforts to gain influence – but an evaluation of the merits and consequences of any given perspective in the contemporary configuration of the epistemological hierarchy. It often looks nefarious or uncouth to seek media dissemination for a particular perspective. Yet, few if any conclusions should be drawn simply from the desire or effort to gain media attention for one's position or preferred frame, nor is success in achieving wide dissemination or interest a useful indicator or criterion for assessing the quality of a scientific perspective.

How then can we evaluate the quality or standing of a perspective in the hierarchy of climate change discourse? One criterion is the degree to which the configuration of the epistemological hierarchy comports with the assessment reports of the IPCC. Max Boykoff and J.M. Boykoff, for instance, could demonstrate that the standing of skeptics in media discourse does not reflect their standing in the IPCC reports, in professional society statements, or in National Academy of Science publications. In this respect, their success in achieving media influence distorted public perceptions of climate change by framing the science as a subject of intense and polarized debate. Barnett suggests a similar criterion in suggesting that conjectures regarding climate change and violent conflict be de-emphasized.[20] Finally, Hulme initially noted that tipping point conceptions of climate change, and of looming danger or catastrophe, were not warranted by IPCC assessments, and were instead the result of a discourse of catastrophe used for policy campaigning and for securing big science budgets.[21]

A different criterion for evaluation is suggested in Hulme's later work and in the conclusion of O'Neill et al., where they state that "an epistemological hierarchy exists in the framing of climate change whereby the geo-sciences disproportionately influence the representation of climate change as primarily an environmental issue."[22] In this perspective, the geo-scientific perspective is criticized

for dominating climate change discourse, and for an inability to encourage a broader range of frames to intermix when generating appraisals of danger. Since climate change is as much socio-cultural and geopolitical as it is geo-physical, this disproportion is damaging if not distorting of the capacity of society to address pressing concerns.

I agree with this position on evaluating competing climate change frames. However, I will suggest a slightly different version of this conclusion in proposing that the security interest in climate change is also advanced by such framing, and that we might anticipate the displacement of the environmental framing by security concerns insofar as the slice of geo-scientific research emphasizing abrupt earth systems change becomes more prominent or even dominant in defining the dangers of climate change.

The Popular Emergence of the Tipping Point Conception of Climate Change

> A planetary early-warning system for tipping elements should be designed and put into place. Finally, assuming early warning can be achieved, the international community should critically evaluate what climate engineering options (if any) it could reasonably deploy, at short notice, to protect certain elements from tipping.[23]

It would seem that 2005 was the year of the tipping point. Not only did earth system scientists and politicians begin warning publicly of the danger represented by climate system tipping points, but both Donald Rumsfeld (former US Secretary of Defense) and Michael Brown (at the US Federal Emergency Management Agency (FEMA)) used the idea of tipping points to explain disaster in Iraq and New Orleans respectively.[24] In the latter instance, it was quite clear that the effort to secure space during dangerous times was a priority.

In previous work, I have attempted to trace the emergence of the tipping point conception of climate change through James Hansen's work, which sought to re-frame perceptions of climate change via the notion of tipping points to create the perception of danger. Famously, the Bush administration attempted to silence Hansen's warnings of danger, as it argued that determinations of appropriate risk and danger were policy matters. Predictably, this effort at censorship ensured that people began to pay attention to Hansen's claims, whose work increasingly used the notion of tipping points to suggest impending catastrophe.

In the UK, Mike Hulmehas identified the origins of public concern with the tipping point conception of climate change in the February 2005 Avoiding Dangerous Climate Change conference, held in Exeter, UK, and hosted by the MET (a trading fund within the Department of Defence). According to Hulme,

> The Exeter Conference signaled a step-change in the ways in which the risks associated with climate change were conceived, presented and debated in the public sphere. Previously, climate change had usually been discussed in terms of incremental changes to the average conditions of climate; incremental changes to which it might – at least in some regions and with some foresight – be possible to adapt….

> But the Exeter Conference opened up to a wider public a third category of climate change risks: abrupt or rapid changes in the climate.[25]

The conference was called by UK Prime Minister Tony Blair to lay the groundwork for his effort to prioritize climate change at the July 2005 G8 summit, and to support the UK contention that the UN Security Council should debate the implications and responses to climate change as well. In 2005, Blair would write in an open letter to the heads of the G8 in which he stated, "[w]e have a window of only 10-15 years to take the steps we need to avoid crossing a catastrophic tipping point," a point of emphasis underlined by his then Environment Secretary, Margaret Beckett. As Beckett noted, "[t]he thing that is perhaps not so familiar to members of the public ... is the notion that we could come to a tipping point where change could be irreversible."[26] The terrorist attack in London during these G8 meetings would dominate global discourse, but the intent of the Blair government to reframe climate change as a security issue was evident with its forceful insistence that the UN Security Council debate the matter for the first time. At that 2007 meeting, the same Margaret Beckett (serving as Foreign Secretary) invoked abrupt climate change threats alongside an admonition to avoid the 'trap' of an environmentalist understanding of the issue, an interesting suggestion from a former Environmental Secretary of State.[27]

The 2005 Exeter Conference sought to distinguish between the gradual and smooth conceptions encouraged by IPCC assessment reports and the tipping point conception of climate change, a contrast Fred Pearce discussed in 2007 as Type I and Type II climate change, and the conference used this contrast to insist on the false sense of security generated by a lack of awareness regarding tipping points in the earth system. A similar intention motivated Hansen's preference for tipping points over the IPCC 'burning diagrams' depiction of risk, which Hansen criticized as "a fuzzy concept that discourages action, action that is needed urgently, because we are on the precipice of climate system tipping points beyond which there is no redemption."

A main convener of the 2005 Exeter conference was German physicist, John Schellnhuber, the science advisor on climate change to German Chancellor Angela Merkel, a leading proponent of earth systems science, and by some accounts, the originator of the climate system tipping point idea. In this respect, the choice of Schellnhuber to convene the Exeter conference underwrote a distinct yet by no means dominant trend in the scientific treatment of climate change, which was the move to adopt "the language of Earth System science and analysis."[28]

It is not easy to characterize the changes that result from adopting the earth systems science perspective on climate change. Its proponents tend to claim that their perspectives will fundamentally alter the way people view the planet, and this vision is used to underwrite an ambitious program of earth system governance. In fact, Schellnhuber has averred that it represents nothing less than a second Copernican revolution.[29] Traceable to the ways of thinking about climate change pioneered by Wallace Broecker, Mike Hulme rightly notes that "new thinking about climate change in the late 1980s was to lead scientists to find new ways of conceiving, representing and modelling climate change."[30] Importantly, Hulme adds "[i]deas such as threshold, abrupt and non-linear changes, and 'tipping points' became part of the new paradigm of Earth system science," and he states that "[i]t remains to be seen how durable and powerful these new conceptions of climate change, pioneered

by Broecker and like-minded colleagues, will prove to be."[31]

The preceding discussion was intended to underline two points. First, earth systems science, as promoted by Schellnhuber and his associates, has transformed the perception of climate change in key sites, and been used as the basis of claims that we are approaching if not already in a dangerous situation. The initial depiction was quite consciously presented as a divergence from IPCC assessments, which were said to encourage a false sense of security in overlooking climate change tipping points, and it is true that tipping points are absent from the first four IPCC assessment reports. As a result of this contrast, we hear that 'things are much worse than we thought.'[32] Second, the prominence of the reconfiguration of climate discourse by earth systems science perspectives owes something significant to the political and media strategies of the Blair government, which used this science to underpin (if not authorize) its efforts to move the discussion of climate change to sites not dominated by environmental concerns, namely the G8 summits and the UN Security Council. In this respect, a previously partial perspective, and one that has arguably been available since at least the 1980s in Broecker's work, was rapidly moved up the epistemological hierarchy of climate change discourse.

It is with this context in mind, and a heap of necessary qualifications, that I discuss a few social features of this newly prominent picture of climate change in its implications for climate security.[33] My goal in this discussion is not to cast aspersions nor suggest earth system science can be safely ignored. On the contrary, this image of the earth system should be explored and debated via a range of frames and knowledge systems if narrow forms of securitization are not to dominate its conceptual, technological and political expression.

Low Profile and Accessibility of Abrupt Climate Change Science

First of all, there is the claim that abrupt climate science is not shaped as significantly by democratic social movements, mainstream regulatory and legislative demands, or even a desire to meet the criteria used by the IPCC leadership to generate authoritative advice to policy-makers. In short, these researchers have had a relatively low profile in the climate change community in terms of government funding, in terms of policy influence and in terms of media attention before the 21st century – indeed, before 2004. Most simply, this means this science could be invoked as a means for involving new perspectives and voices in climate change debates. More significantly, it means that the context for the production and dissemination of abrupt climate change science was not as strongly shaped by environmentalist sensibilities as other climate-related research.[34]

In order to appreciate this point, it is important to recognize how closely the development of climate change as a political problem was connected the institutions and practices of environmental activism. To take just one example, it was at the behest of Friends of the Earth that the US Council of Environmental Quality advocated for serious attention to climate change at the presidential level for the first time. At the time, President Jimmy Carter's head of the CEQ was the co-founder and long-time lead attorney of the NRDC, Gus Speth, and the memo was written by influential scientists (Roger Revelle, David Keeling, George Woodwell and Gordon MacDonald).[35] More generally, it is fair to say, as Manuel Castells does in summarizing Spencer Weart's history of climate science, "that during this time the rhetoric and attitudes of the environmental movement spread rapidly

among climate researchers, and a new view of the relationship of science and society started to emerge in the media."[36]

Whereas mainstream climate research and policy has been shaped significantly by a long tradition of environmentalist concern – concerns shaped strongly by activism and democratic traditions of participation – abrupt climate change research has ascended and grown quickly due to private entrepreneurial support, and it has entered into policy discourse much differently and rather more rapidly than other forms of environmentalist concern. It is the independent funding of Lands' End founder, Gary Comer, which helped quickly raise the research capacity and profile of abrupt change research, and with an eye to establishing such work in US government funding opportunities. Comer decided in 2002 to raise the standing of abrupt climate change science by direct funding of hand-selected scientists, and with an eye to having such science integrated into more conventional channels. In one account, Comer "changed the field," in another account, he may have doubled the amount of research money targeted for abrupt change in the United States.[37]

False Sense of Security Argument

Abrupt climate change became especially prominent in the popular media in 2004, with the release of the so-called Pentagon report and the release of the Hollywood film "The Day After Tomorrow." In both cases, the Broecker paradigm was used to inspire a rather ridiculous series of imaginary scenarios. Yet, the filtering of this climate science through a security framework – whether tongue-in-cheek in the case of "The Day After Tomorrow" which turned the prototypical national security fear of forced migration back upon the US political order, or with silly seriousness in the case of the Pentagon report – provided hints that something in this depiction of climate change was of compelling interest to those interested in securitization.

In more serious forums, there is the claim that mainstream depictions of climate change may have created a false sense of security. The argument makes intuitive sense, although its implications are not clear. Interestingly, it was more common to warn of 'surprises' than a 'false sense of security' in the 20th century warnings of abrupt climate change. Using historical analogies to pre-historical events, abrupt climate change researchers claim that we might experience climate change as a series of unpleasant surprises, and that we do not have the experiences, conceptual framework, technological system, institutional designs, or governance strategies in place to cope with this possibility. The argument was forwarded in prominent fashion as long ago as 1987, and it is fair to say it has been rather summarily excluded as an influential factor in IPCC reporting, climate policy negotiations, proposed national legislation in any country, and environmental activism until the period under study in this paper, 2005-2010.

A series of interesting implications appear to follow from this situation. One, it suggests that 'democracies' or 'democratic processes' cannot handle or incorporate these assumptions, and so other institutions must do so.[38] In this respect, military, intelligence and security agencies become sites where debate over the implications of abrupt climate change takes place. Two, there are the conceptual and technological proposals needed to replace our false sense of security with a real sense of safety – or, more likely, a real sense of insecurity. Conceptually, the tipping point conception of the earth system has remained fuzzy until its primary proponents collaborated with scholars of

complexity and resiliency theory to recode sustainability into the language of planetary boundaries.[39] In this conception, very fundamental earth systems processes are divided into two states – safe operating space and a danger zone – divided by scientifically validated thresholds or boundaries. The goal is to manage the resiliency of the earth system by avoiding proximity to thresholds where shifts to alternative states become possible. The assumption here is that managing resiliency is easier than managing the abrupt shift in circumstances, the unknown nature of the transition, and the unknown nature of the alternative state into which we settle. In this view of the earth system, we need a planetary monitoring system, a warning system and a capacity to respond to warnings via a reliable governance structure, a point discussed in the next paragraph. Less obviously, since we cannot rule out abrupt transitions, we should be prepared with contingency plans for this unknowable and necessarily indeterminate situation. Since democratic institutions have failed to accept and plan for such contingencies, we should expect other institutions to do so, and realize that securitization is the likely outcome.

Technologically, Schellnhuber describes the interconnected role of computer simulations, global databases and remote sensing capability in terms of planetary monitoring, and in a highly idiosyncratic way. These are 'macroscopes,' in his conception, and necessary for perceiving and governing planetary systems on behalf of a global subject, or a modern (and presumably benign) Leviathan. According to Schellnhuber "[t]he global subject will reign over the centuries to come."[40] In seeking to explain how climate research is attractive to proponents of climate security, Barnett describes the panoptic gaze of climate models, and the models' "supposedly objective and total view of global space," a view that is quite consonant with the "practical geopolitics of the mainstream security policy community."[41] Importantly, Barrett notes it is a misuse of such models to draw or infer deterministic conclusions of the sort involved in mastering space and nature through global surveillance. Such concerns do not motivate the modelling scenarios used in IPCC assessment reports, Barrett argues. If, however, we accept that scientists often speak of modelling capacities in terms oriented to the needs and demands of policy-makers, we should not simply smile at Schellnhuber's lack of humility. As Eva Lövbrand, Johannes Stripple and Bo Wiman observe of such proposals, "A new political space for government intervention is also in the making."[42] For the first time, basic planetary processes would be managed and governed by conscious political calculation, and the novelty of this situation should not be obscured by observations that a kind of unconscious geo-engineering has been ongoing since the advent of industrialization. Moreover, given the current threshold of 350 parts per million CO2e in the atmosphere, the proposed tipping point for climate change, it is clear that we will live in an unsafe or danger zone for many decades to come, a crisis situation that would seem to authorize geo- and climatic engineering projects.

It is clear, then, that the 'wake-up' call regarding the false sense of security that pervades popular opinion on climate change is very likely to recommend a conceptual, technological and managerial structure in which we are to live with a real sense of insecurity, or perhaps even in a state of emergency, at least for the foreseeable future.

Conclusion

In 2003, Jon Barnett speculated on the future contours of climate change discourse in perspicuous fashion, and raised questions regarding the implications of framing climate change as a security issue. While recognizing the way security discourse encapsulated 'danger' better than sustainability or environmental perspectives, Barnett argued that "national security discourse and practice tends to appropriate all alternative security discourses no matter how antithetical … in ways that neutralise their efficacy whilst maintaining the power of the security establishment." In Barnett's opinion, the most promising path was "a grounding in the findings of the Intergovernmental Panel on Climate Change," through which climate security discourse "could better resist appropriation from conventional national security." Thus, "[i]f used by IPCC scientists a change-security discourse will have a legitimacy that renders it less amenable to appropriation and rewriting by conventional national security institutions."[43]

It remains to be seen whether the tipping point conception of climate change will be wholly embraced by the next IPCC assessment report, and if so, whether this will have the desired effect hoped for by Barnett, as opposed to carrying the interests and goals of Anglo-American security into mainstream climate change discourses. It is clear, however, that the proponents of earth systems science have designs for a global management and governance structure in mind that would entail planetary surveillance and early warning systems. The refreshingly blunt if analytically loose talk of a new 'Leviathan' or 'Global Subject' is unlikely to win out in unrevised form, but it does raise questions regarding which agencies will make determinations regarding the thresholds between safety and danger zones, and whether they can be shaped by less iconoclastic pillaging from Western traditions of political and democratic theory. After all, earth systems science is not the only epistemological system to recognize that the 'trail of the human serpent is over everything.'

If democratic and participatory social movement traditions are to avoid being relegated to the sidelines, and if we are to avoid making a whole range of cultural practices and biological processes susceptible to securitization while entrenching the socio-economic systems most responsible for pushing ecosystems to dangerous boundaries, then we must interpret the implications of earth systems science through a wider range of participating parties, and by ensuring the resilience of democratic systems as well as earth systems. Otherwise, the instability of the earth system as created by industrial societies will be used as evidence of the insufficiency of democratic and participatory traditions of decision-making.As Dalby notes, "[t]he key point about the operation of securitization is precisely that it refers to pressing and immediate situations that normal political life cannot address."[44]

In conclusion, I recognize that this paper has done little more than lay out some suggestive directions for studying climate security discourse. A more rigorous and wide-ranging study is needed to confirm the impressionistic view offered here regarding the prioritizing of abrupt and catastrophic earth system science perspectives in those institutions and documents most likely to shape the future of such climate security discourse. This study would need to be better attuned to the struggle between national security and human security perspectives over the last 20 years or so, and recognize the differences in national context between the UK, United States and other places earth system science has a foothold, like Germany, and those countries invested in resilience management.[45] Not surprisingly, the Canadian situation is influenced by both the US and UK discourse – Sabrina Schulz

is the now serving as the British High Commission's Climate Security project leader in Canada, and US climate security reports formed the basis for a recent workshop on the subject in Ottawa.

Finally, it is not my intent to promote an overly homogenous view of the community of earth system, resilience science researchers, national security institutions, or environmentalists. I am most definitely not suggesting that abrupt change scholars are warmed over cold warriors. Instead, I'm intrigued by the way the securitization projects of the last decade have shaped the contexts in which the most pressing matters of the day are debated, funded and entered into public discourse, and I cannot imagine that this deep cultural shift is without consequence for climate change discourse. It is because I believe that complexity and resilience theories are invaluable that I suggest we attend to the questions treated here, and that we strive to articulate a much more robust 'human security' perspective when advancing the conceptions of earth system change discussed above.

Notes

1. Margaret Beckett, "Climate Change: 'The Gathering Storm,'" Annual Winston Churchill Memorial Lecture, New York, 16 April 2007, available at http://collections.europarchive.org/tna/20080205132101/http://www.fco.gov.uk/servlet/Front?pagename=OpenMarket/Xcelerate/ShowPage&c=Page&cid=1007029391629&a=KArticle&aid=1176453874175.
2. Representative Anna Eshoo (D-CA), "National Intelligence Assessment on Climate Change," 2008, cited in John Wihbey, "Covering Climate Change as a National Security Issue," The Yale Forum on Climate Change, 17 July 2008, available at http://www.yaleclimatemediaforum.org/2008/07/covering-climate-change-as-a-national-security-issue/
3. Climate Security Project, "Warming Means War," 2008, available at www.globalclimatesecurity.org/about; Gwynne Dyer, *Climate Wars* (Canada: Random House, 2008).
4. Jon Barnett, "The Prize of Peace (is Eternal Vigilance): A Cautionary Essay on Climate Geopolitics," *Climatic Change*, Vol. 96, No. 1-2 (2009), p. 3.
5. Mike Hulme, "Climate Security: The New Determinism," Open Democracy, 20 December 2007, available at http://www.opendemocracy.net/article/climate_change/the_new_determinism.
6. See Geoffrey Dabelko for this point.
7. I am not suggesting that Barnett or Hulme draw this conclusion.
8. There is a wide range here from the mere rhetorical opportunism, "warming means war," to efforts to build a coalitional politics of sorts, to Amory Lovens' efforts to help the US Department of Defense become a more effective fighting force by becoming greener.
9. As well, this short manuscript cannot focus on analysing the primary documents produced by climate security proponents to chart empirically the uptake of earth systems science and abrupt climate change in this work. In this respect, the invocations of security, intelligence and military agencies remain regrettably vague.
10. By discourse, I follow in the research tradition of Karen Litfin, Maarten Hajer, Ron Greene and my colleague, Graham Smart. As a definition there is Hajer, "an ensemble of ideas, concepts and categorizations through which meaning is given to social and physical phenomena, and which is produced, reproduced, and transformed in a particular set of practices," available at www.maartenhajer.nl/index.php?Itemid=19&id=17&option=com_content&task=view.

11. See Saffron J. O'Neill, Mike Hulme, John Turnpenny and James Screen, "Disciplines, Geography and Gender in the Framing of Climate Change," *Bulletin of the American Meteorological Society*, forthcoming, available at http://journals.ametsoc.org/toc/bams/0/0.
12. The work of Matthrew Nisbet has become a frequent point of departure for framing analysis. My definition draws from the work of Mike Hulme, *Why We Disagree About Climate Change* (Cambridge University Press, 2009).
13. For the term 'monsters,' see Fred Pearce, *With Speed and Violence: Why Scientists Fear Tipping Points in Climate Change* (New York: Beacon Press, 2007); 'beasts' is a well known phrase of Wally Broecker.
14. See Chris Russill and Zoe Nyssa, "The Tipping Point Trend in Climate Change Communcation," *Global Environmental Change*, Vol. 19, No. 3 (2009), pp. 336-344; and Hulme, *Why We Disagree about Climate Change*.
15. O'Neill, Hulme, Turnpenny and Screen, "Disciplines, Geography and Gender in the Framing of Climate Change," p. 3.
16. Max Boykoff and J.M. Boykoff, "Balance as Bias: Global Warming and the US Prestige Press," *Global Environmental Change*, Vol. 14 (2004), pp. 125–136.
17. O'Neill, Hulme, Turnpenny and Screen, "Disciplines, Geography and Gender in the Framing of Climate Change," p. 5.
18. *Ibid*., p. 5.
19. Before proceeding, a few qualifications are in order: I want to skip past the methodological questions involved in determining the current configuration of an 'epistemological hierarchy' in any given cultural space, and I'll deal only implicitly with the difficult theoretical questions of the interrelationships of scientific, public, policy and political sites where the configuration of the hierarchy might differ, as well as the more tangled questions involved in determining how or why one should prefer one frame over another in any particular cultural site. I find these questions important and I agree with O'Neill, Hulme, Turnpenny and Screen that more varied and intermixable frames are of importance since climate change is a socio-cultural and geopolitical matter as much as it is geophysical or scientific one. However, there remain difficult questions regarding whether or not the simple proliferation of more frames is a good thing, and whether and how subjugated knowledge can be made more salient or rendered relevant to the political struggles over environmental space. For further reflections on these issues, see Chris Russill, "Temporal Metaphor in Abrupt Climate Change Communication: An Initial Effort at Clarification," *Social, Economic and Political Aspects of Climate Change*, (New York: Springer, 2010).
20. Jon Barnett, "Security and Climate Change," *Global Environmental Change*, Vol. 13 (2003), pp. 7-17.
21. Mike Hulme, "Chaotic World of Climate Truth," BBC News, 4 November 2006, available at http://news.bbc.co.uk/2/hi/6115644.stm.
22. O'Neill, Hulme, Turnpenny and Screen, "Disciplines, Geography and Gender in the Framing of Climate Change," forthcoming; and Hulme, *Why We Disagree About Climate Change*, are seeking to broaden the range of perspectives permitted to make statements regarding climate change, and in the latter case, offering an image of science that accepts its shaping by socio-cultural contexts in a very significant way.
23. Tim Lenton and Hans Joachim Schellnhuber, "Tipping the Scales," *Nature Reports Climate Change,* 2007, available at http://www.nature.com/climate/2007/0712/full/climate.2007.65.html.
24. See Chris Russill and Chad Lavin, "Tipping Point Discourse in Dangerous Times," *Canadian Journal of American Studies*, forthcoming.
25. Hulme, *Why We Disagree about Climate Change*, pp. 178-179.
26. Quoted in Chris Russill, "Tipping Point Forewarnings of Climate Change: Some Implications of An

Emerging Trend," *Environmental Communication* Vol. 2, No. 2 (2008), pp. 133-153.

27. Beckett was Secretary of State for Environment, Food and Rural Affairs from 2001-2006, and Foreign Secretary from 2006-2007, during which she shepherded the UK effort to situate climate change as a security issue. When Gordon Brown replaced Tony Blair as Prime Minister, Beckett was removed as Foreign Secretary and replaced by David Miliband, who had taken Beckett's position as Environment Secretary.
28. Hulme, *Why We Disagree about Climate Change*, p. 289.
29. Hans Joachim Schellnhuber, "'Earth System' Analysis and the Second Copernican Revolution," *Nature*, Vol. 402 (1999), pp. C19-C23.
30. Hulme, *Why We Disagree about Climate Change*, p. 60.
31. The question of paradigm change is a complex one and climate science is a moving target comprised of a startling array of scientific disciplines, such that very general claims about the state of the science are often of little value. However, we might underscore the novelty of the prominence of the earth systems perspective represented by Schellnhuber by observing that in Spencer Weart's authoritative (if US-centred) history of the scientific study of global warming, Schellnhuber's name does not appear once. He does not appear in the 2004 edition. In the updated and expanded 2008 edition, Schellnhuber is quoted from a *New York Times* article sharing his frustration with the IPCC AR4 process, as which he was a leading contributor. Similarly, Fred Pearce's prominent reporting for the *New Scientist* and his subsequent 2007 book, encouraged the view that abrupt change science had been overlooked, and that it was the purview of passed over or even 'maverick' scientists, whose ignored ideas were just now emerging as the new mainstream.

    The point *is* contestable, however, and deserves further elaboration as Schellnhuber has played an extraordinarily prominent role in IPCC reports, European climate policy negotiations, and, more importantly, in striving to re-orient policy around the 2 degree threshold for dangerous climate change, even as he has advocated for the relevance of more catastrophic scenarios and tipping point warning systems. Finally, it is not my intention to simply run together the abrupt change paradigm of Broecker, which was strongly grounded in paleoclimatic indicators from ice, land, and marine settings, with the more mathematized modelling bent of complexity and cybernetic control theories that interest Schellnhuber.
32. Hansen offers one way to reconcile the divergent views in his discussion of climate sensitivity. Hansen expresses great confidence in his estimate of climate sensitivity, but points out that it holds only for the present state of the earth system; if relevant tipping points are crossed, and if we flip into alternative climate states, then all bets are off, and the sensitivity will vary widely, even to the point of threatening runaway climate change or Snowball Earth scenarios. In this respect, I expect that the Earth Systems Science perspective does not represent a new paradigm for Hansen, at least if paradigm shift requires the kind of sudden conversion experience prioritized in Kuhn's work. Instead, the main difference between Hansen's work now and his work in the 1980s is the finding that positive feedbacks are much quicker and more dominant than previously thought: "The most startling advances in recent understanding of climate change involve the realization that the dominant slow feedbacks are not only amplifying; they are not nearly as slow as we once believed." See James Hansen, *Storms of My Grandchildren* (London: Bloomsbury Press, 2009), pp. 44-45.
33. More importantly, a comparison with the far richer conversation on climate change and security in the German context is required.
34. Some superficial signs of securitization interest are obvious, yet perhaps rather trivial, such as the use

of army bases for core drilling, or of data on sea ice compiled by nuclear submarines.

35. For an expanded consideration of this point, see Chris Russill, "Truth and Opinion in Climate Change Discourse: The Gore-Hansen Disagreement," *Public Understanding of Science*, 2010, pp. 1-14, available at http://pus.sagepub.com/cgi/content/abstract/0963662510364201v1
36. Manuel Castells, *Communication Power* (Oxford: Oxford University Press, 2009), p. 307.
37. Richard A. Kerr, "An Entrepreneur does Climate Science," *Science*, Vol. 311 (24 February 2006), pp. 1088-1090, citations from 1088. Comer's involvement should not be interpreted as the interjection of hawkish views into abrupt change research. I mention it to indicate how much impact an external influence could have on getting specific studies produced and interjected into mainstream channels – an influence symbolically noted by the inclusion of Comer on peer reviewed science publications, which the primary authors insist was not merely honorific.
38. It is very attractive to interpret the Copenhagen Accord in this way for two reasons. First, there is no good path forward found in that document and, second, the accord was completed, announced, and assented to in a less than inspiring way (including diplomatic punishment for those countries dissenting from this obvious break with democratic process). In this respect, once might conclude that democratic processes fail because the issue is too politicized, or more interestingly, it might be said that the dominant policy mechanisms we have constructed demand consensus and significant certainty to be acted upon, such that the inherently indeterminate science of abrupt climate change cannot enter policy reflection. In either instance, the case for the involvement of security institutions is strengthened.
39. Johan Rockström et al. "A Safe Operating Space for Humanity," *Nature*, Vol. 461 (2009), pp. 472-475.
40. Schellnhuber, "'Earth System' Analysis and the Second Copernican Revolution," p. C22.
41. Barnett, "The Prize of Peace (is Eternal Vigilance)," p. 3
42. Eva Lövbrand, Johannes Stripple and Bo Wiman, "Earth System Governmentality: Reflections on Science in the Anthropocene," *Global Environmental Change – Human and Policy Dimensions*, Vol. 19 (2009), p. 11.
43. Barnett, "Security and Climate Change," pp. 14-15.
44. Simon Dalby, "Anthropocene Security," 2009, available at http://http-server.carleton.ca/~sdalby/papers/DalbyAnthropoceneISA2009.pdf.
45. Also, there are important exceptions to this trend, as some security assessments are firmly grounded in IPCC Assessment Reports. For example, see Joshua Busby's report for the Council of Foreign Affairs in the United States.