

From convergence to contention: United States mass media representations of anthropogenic climate change science

Maxwell T Boykoff

This article focuses on connected factors that contribute to United States (US) media reporting on anthropogenic climate change science. It analyses US newspapers and television news from 1995 to 2006 as well as semi-structured interviews with climate scientists and environmental journalists. Through analyses of power and scale, the paper brings together issues of framing in journalism to questions of certainty/uncertainty in climate science. The paper examines how and why US media have represented conflict and contentions, despite an emergent consensus view regarding anthropogenic climate science.

key words United States anthropogenic climate change mass media framing

Environmental Change Institute, Oxford University Centre for the Environment, University of Oxford, Oxford OX1 3QY
email: maxwell.boykoff@eci.ox.ac.uk

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Is scientific consensus the 'truth' translated?

While it can be challenging to appropriately characterise and delineate general views in a broadly construed 'scientific community', the collaboration of top climate scientists from around the world through the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC) presents a unique opportunity to do so. Over the past two decades, IPCC endeavours have enhanced understanding of global climate change through careful interpretation of emerging climate research via peer-reviewed and consensus-driven processes (Agrawala 1998). Adger *et al.* (2001) have explored different climate change discursive regimes, and have described a 'managerial discourse' as one that draws primary authority from scientific findings, focuses on macro-scale solutions and bases actions on external policy interventions. This work thus concentrates on the IPCC as a group that effectively articulates a managerial discourse that interacts with national and international policy discourse.

With increasing confidence, the IPCC has reached consensus that climate change is an issue that has

human (anthropogenic) influences.¹ The convergent view regarding anthropogenic climate change has been articulated in a number of key documents since 1995, beginning with the IPCC Second Assessment Report (SAR). It stated, 'The balance of evidence suggests that there is a discernible human influence on the global climate' (Houghton and Filho 1995, 4). This consensus view has been strengthened in the years that followed. Prominently, the Third Assessment Report in 2001 contained the statement that 'There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities' (Houghton *et al.* 2001, 10). These 'critical discourse moments' (Carvalho 2005) have solidified a storyline of consensus regarding anthropogenic climate change.

Over the last dozen years, this managerial discourse has tethered institutional activities and actors² to storylines that surround human contributions to climate change, and has reproduced itself (or has sought to do so) through policy-relevant research statements and decisions. This paper therefore examines the entrenched scientific consensus on anthropogenic climate change, and works to explain how these convergent views within science have

been presented as contentious when reported through US mass media.³ Through this case-study analysis, this research brings together issues of framing in journalism to questions of certainty/uncertainty in climate science.

Taylor and Buttel posited that the organisational arrangements that define what are environmental problems (such as anthropogenic climate change) can be seen as 'particularly vulnerable to deconstruction' (1992, 406). Others have pointed out that as scientific understanding improves, rather than settling questions, it often unearths new and more questions to be answered. Moreover, *greater* scientific understanding actually can contribute to *more* complicated policy decisionmaking by offering up a greater supply of knowledge from which to develop and argue varying interpretations of that science (Sarewitz 2004). In other words, anytime that the biophysical is captured and categorised at the science–practice interface, it undergoes varying degrees of politicised interpretation, as influenced by power and scale via temporal and spatial contexts (Jasanoff and Wynne 1998). Thus, in the discourse assembled by the IPCC, a certain way of viewing things is privileged, and a particular 'storyline' has gained salience (Hajer 1993). In the case of anthropogenic climate change, the stakes within and between carbon-based industry and society are high. Therefore, the science–practice interface becomes a particularly strategic discursive battlefield, and one particularly important for intervention through approaches in geography (Burgess 2005).

Research has found that mass media representations powerfully shape translations between climate science, policy and the public (e.g. Bell 1994). In discussing US mass media influence, Bennett states,

Few things are as much a part of our lives as the news ... it has become a sort of instant historical record of the pace, progress, problems, and hopes of society. (2002, 10)

Power in this analysis is treated as relational, shaping knowledge and discourses between individuals and communities. As Foucault writes,

it is not the activity of the subject of knowledge that produces a corpus of knowledge, useful or resistant to power, but power-knowledge, the processes and struggles that transverse it and of which it is made up, that determines the forms of possible domains of knowledge. (1979, 27–8)

Professional and disciplinary practices make actors both the object of discipline and the instruments of its exercise (Foucault 1984). Tracing dynamic power

relations and processes helps to inform media representations of anthropogenic climate change. In the production of news, journalists generate stories within asymmetrical power relationships, as well as through rich histories of professionalised journalism (Starr 2004). Moreover, wider discourses shape power relations within journalism. Socio-political and economic factors have given rise to distinct norms and values, and these that buttress journalistic practices (Bennett 2002). These mobilisations are complex, and often subtle as well as contradictory. In fact, discontinuities can arise in media coverage of anthropogenic climate change through the very professional journalistic norms and values that have developed to safeguard against potential abuses of asymmetrical power.

Through this lens, US mass media coverage of anthropogenic climate change is not a simple collection of news articles and clips produced by journalists and producers; rather, media coverage signifies key frames derived through complex and non-linear relationships between scientists, policy actors and the public that is often mediated by journalists' news stories. Thus, through framing – constructed through processes of power and scale – media coverage of anthropogenic climate change can depict an arena of great confusion and intense conflict rather than scientific consensus. The terms of the resulting 'disagreement' are influenced by ways in which these social relationships are characterised over time. Framing is an inherent part of cognition and is a tool employed to contextualise as well as 'fix' interpretive categories in order to help explain and describe complex environmental processes (Robbins 2001). It can be defined as the ways in which elements of discourse are assembled that then privilege certain interpretations and understandings over others (Goffman 1974). The process of media framing involves an inevitable series of choices to cover certain events within a larger current of dynamic activities. These events are then converted into news stories. Entman states that,

framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition. (1993, 52)

Framings – and therefore construction of meaning and discourse – are then derived through combined structural and agential components, and shape the interpretation of 'news'.

A number of scholars through time have looked at different aspects of the politicised landscape within which scientific authority (such as the IPCC) has arisen and is maintained as well as negotiated at the interface with policy and practice. Frameworks that have been developed adopt a range of perspectives, from a 'deficit model' of science-policy communications where scientific findings fill a knowledge gap for policy use (e.g. Roberts 2004) to more complex formulations where facts-values interact with nature-society (e.g. Latour 2004). The spectrum of views offers a spectrum of advantages as well as drawbacks. For instance, in the case of the 'deficit model', it has been critiqued for being too simple a characterisation of the dynamic interactions therein, as well as overly adopting a Mertonian vision of science as open, universal and objective (e.g. Collins and Evans 2002; Oreskes 2004). The latter Latourian perspective has introduced many layers of complexity, which serve to limit its functional application (e.g. Castree 2006). While this paper does not endeavour to delve centrally into these varied perspectives (see Demeritt 2006 for more), it is important to acknowledge such subjective complexities when interrogating US coverage of scientific explanations of anthropogenic climate change. While positivist approaches work to understand and interpret already existing social reality, the social constructivist position adopted in this analysis interrogates how power and scale constructs, reflects and reveals heterogeneous and complex phenomena such as language, knowledge and discourse (Forsyth 2003). Rayner has grappled with these epistemological challenges:

For good or ill, we live in an era when science is culturally privileged as the ultimate source of authority in relation to decision-making. The notion that science can compel public policy leads to an emphasis on the differences of viewpoint and interpretation within the scientific community. From one point of view, public exposure to scientific disagreement is a good thing. We know that science is not capable of delivering the kinds of final authority that is often ascribed to it. Opening up to the public the conditional, and even disputatious nature of scientific inquiry, in principle, may be a way of counteracting society's currently excessive reliance on technical assessment and the displacement of explicit values-based arguments from public life. However, when this occurs without the benefit of a *clear understanding* of the importance of the substantial areas where scientists *do* agree, the effect can undermine public confidence. (2006, 6; emphasis added)

The focus here is on how 'clear understanding' in science – scientific consensus on anthropogenic climate change – has been framed by US mass media rather as contention and conflict, and the effects this has on policy and public confidence. This approach therefore makes it possible to reconcile the unavoidably politicised science illustrated by that of IPCC with this distinct facet of climate change. In other words, this consensus is not the 'truth' translated, but signifies an aspect of climate change where there is clear understanding. Demeritt has noted this ongoing tension at the interface of climate science-practice. He states that,

the notion of a purely scientific realm of objective facts as distinct from a political one of contestable values is idealized by nearly all participants in debates about climate change, even as it is habitually breached in ordinary practice. (2006, 472)

Therefore, in 'ordinary' practice, policy-relevant work of the IPCC embodies multiple views of the role of science in policy. On one hand, there exists an element of deficit model processes, as the assembly of top climate science in IPCC reports does fill a knowledge gap that proves useful for policy considerations. On the other hand, the 'facts' that emerge in these documents are also influenced by values and perspectives at the human-environment interface. Therefore, while viewing IPCC deliberations as imperfect and IPCC reports as heterogeneous constructs of facts and values, this analysis remains useful in order to track concatenate movements of convergence (in climate science) and confusion (through media coverage of anthropogenic climate change).

Methodology

This paper draws from a dataset of US newspapers and television news from 1995 to 2006 as well as semi-structured interviews with climate scientists and environmental journalists, in order to analyse various ways in which power and scale influence the contemporary discursive landscape. Tracing these influences helps to explain how US media have depicted conflict rather than coherence regarding scientific explanations of anthropogenic climate change over time.

Analyses of discourse in US newspapers and television news began in 1995 because consensus in the climate science community regarding anthropogenic climate change emerged clearly in this

Table I A sampling of interview questions posed to climate scientists

'How do you feel about the way that climate change science regarding human contributions has been represented in the United States media?'

'What is your view of the ways in which anthropogenic climate science has been framed in the United States news media over time?'

'Do you agree with research that finds that humans contribute to climate change?'

'Do you see media representational practices affecting how your work is interpreted in policy and public communities? If so, how?'

Table II A sampling of interview questions posed to environmental journalists

'Please discuss what you see as some factors that affect media representations of climate science'

'In your view, how do various journalistic norms shape US media coverage of anthropogenic climate change?'

'What are particular challenges to contemporary media coverage of anthropogenic climate change, as you see them?'

'In your view, how can interactions between scientific and policy-actor communities – shaped by US media – be improved through media changes?'

year. Television and newspapers are deemed most influential communications media: a Pew survey found that 57 per cent of people in the US said they got some television news, while 40 per cent said they read a newspaper 'yesterday' (Pew 2006).⁴ The dataset utilised here was compiled through searches with the key terms 'climate change' or 'global warming'.⁵ The unit of analysis was the news article/segment and analyses took place within the particular article/segment (intra-text) as well as examining relations between articles/segments (inter-textual). For newspapers, the focus was on the *New York Times*, the *Los Angeles Times*, the *Washington Post* and the *Wall Street Journal*, due to their high daily average circulations as well as their influence on smaller newsrooms across the country (Project for Excellence in Journalism 2006). Moreover, these four newspapers most often break science stories then picked up by wire services such as the *Associated Press* (Wilkes 2002). From a population of 4721 articles, accessed through the databases *LexisNexis Academic* and *Proquest/ABI/Inform*, the random sample comprised 17 per cent of the population. Within television news, segments from network-evening newscasts – *ABC World News Tonight*, *CBS Evening News*, *NBC Nightly News*, *CNN WorldView*, *CNN Wolf Blitzer Reports* and *CNN NewsNight* – were accessed and compiled through the *Vanderbilt University Television News Archive*. These programmes were selected because of their influence and high levels of viewership (Project for Excellence in Journalism 2006). From 1995 to 2006, 286 news segments were broadcast on these

programmes, and the random sample comprised half the population.

This project also incorporated 40 semi-structured interviews with scientists and journalists, which took place between October 2004 and September 2005. These interviews were conducted in order to examine situated views regarding portrayals of anthropogenic climate change science in the media, and to validate as well as discuss findings in news segments/articles. Questions covered a range of issues regarding media representations of climate science and connections to climate policy as well as public understanding of anthropogenic climate science research. Interview content also followed on comments made by interviewees therein. Table I provides a sampling of questions posed to climate scientists and Table II shows some examples of questions for environmental journalists. Many similar questions were asked of both groupings of interviewees. These newspaper and television data sets as well as the interview data were contextualised through assessments from concurrent and salient climate research.

The media–science–policy interface and anthropogenic climate change

Since 1995, media coverage of climate change has ebbed and flowed (Figure 1). Briefly, key and concatenate events garnered particular increases in media attention. For instance, in 1997 the negotiation of the Kyoto Protocol provoked a surge in coverage. Moreover, the lead-up to the event – including a

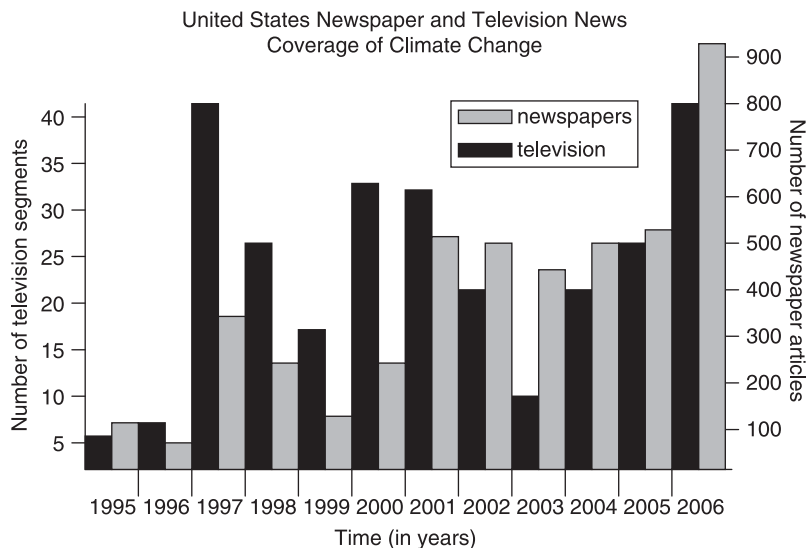


Figure 1 United States newspaper and television news coverage of climate change

95–0 US Senate resolution against US participation in the Kyoto Treaty,⁶ as well as a carbon-based-industry-funded advertising campaign opposing US ratification – contributed to an upswing in media articles and reports. As another example, the events of 2006 also generated a deluge of media attention. Contributing to this increase was the opening of the documentary film ‘An Inconvenient Truth’, as well as the release of the UK ‘Stern Review’ on the economics of climate change action. Moreover, these primed discussions of climate change as a policy issue in the US mid-term Congressional elections that autumn. Elsewhere, Boykoff and Boykoff examine in detail reasons for fluctuations in coverage during this period (2007).

Focusing on the content of coverage, media depictions consistently framed discussions of anthropogenic climate science as contentious, despite the aforementioned consensus. Political economic factors as well as social and cultural influences (to be discussed further below) permeated and influenced the quality of US television and newspaper coverage over time. Examples in the dataset abound. Provided are four pieces that are representative of the framing of contention of such coverage of anthropogenic climate science.

First, a *Washington Post* article on the 1995 IPCC SAR covered the consensus on anthropogenic climate science, but did so through a focus on contentious comments and counterweights to these

claims. The piece was titled ‘Reaching a Consensus Is the Hot Topic at Global Climate Conference’. After quoting the president of the Maldives calling for urgent action to combat sea level rise, the author wrote,

On the other hand, some skeptical meteorologists and analysts assert that global warming reflects a natural cycle of temperature fluctuation and cannot be decisively tied to human actions.

The article closes with this statement from astrophysicist Piers Corbyn:

As far as we are concerned, there’s no evidence for global warming, and by the year 2000 the man-made greenhouse theory will probably be regarded as the biggest scientific gaffe of the century. (Atkinson 1995, A10)

This piece illustrates how coverage of consensus has been undertaken through the frame of ‘contention’.

Second, an *NBC Evening News* report called ‘Clearing the Air’ in 2003 focused on ‘Bush Administration claims that (the EPA draft ‘Report on the Environment’) didn’t contain sound science’ (Gregory 2003). This reasoning sought to justify ongoing Bush interventions in the language in the document regarding anthropogenic climate change. Because of such tinkering, the EPA ultimately deleted the entire section on climate change, because they felt that such manipulation inaccurately represented the consensus science. The story spotlighted EPA

(science) and White House (policy) conflict, and lesser attention was paid to what the suppressed consensus statement was. Rather than a focus on the convergent views regarding anthropogenic climate science that drove the draft report assessments, the correspondent David Gregory instead drew attention to disagreement. He commented that there was 'too much uncertainty about the causes of global warming science to draw conclusions for this report'.

A third illustrative example is from 2003 *New York Times* coverage of Exxon-funded groups questioning anthropogenic climate change. In the piece titled 'Exxon Backs Groups that Question Global Warming', the contention frame places the Exxon position against that of consensus. For instance, Tom Cirigliano – spokesperson for Exxon – stated,

There is this whole issue that no one should question the science of global climate change that is ludicrous. That's the kind of dark-ages thinking that gets you in a lot of trouble.

The piece concluded,

Critics say that Exxon and these groups continue to muddle the debate even as scientific consensus has emerged, and as much of the industry has taken a more conciliatory stance toward the reality of global warming.

Throughout, there was scant discussion of the convergent scientific view.

The fourth example is that of the statement by US President George W. Bush on CNN in 2006 that, 'I have said consistently that global warming is a problem. There is a debate over whether it is man-made or naturally caused' (2006).⁷ This statement was aired unabated, and thus served to fuel an atmosphere of confusion and conflict.

These illustrate US television and newspaper coverage in the sample set that contributed to an appearance of a storyline of increased uncertainty and debate over time. The following discussion section examines reasons shaping such frames of contention via multiple scales and dimensions of power.

Media framings through multiple scales and dimensions of power

Interviewees in this study primarily attributed such framing to two related factors. First is the coherence and cohesion of a group of dissenters – called 'climate contrarians' – that have utilised media attention to challenge findings regarding the

presence of an anthropogenic climate change signal, coupled with insufficient responses from the managerial scientific community. Second are the challenges in dealing with uncertainty in translations between science and policy as well as the public via mass media.

In regards to the first point, contentious challenges to anthropogenic climate science manifested through a group of 'climate contrarians' who have gained greater discursive traction through the media, and, as a result, have significantly affected public understanding. In an interview with a NOAA climate scientist who chose to remain anonymous, he commented,

Through media coverage of climate change focusing on the skeptics over the years, policy-makers and the general public have been done a disservice.

Research by McCright and Dunlap (2000 2003) has focused on this opposition movement, and examined how these contrarians have spoken out stridently against the convergent view on anthropogenic climate science, and through this privileged access and power, have amplified uncertainty and disempowered top climate science.⁸ In an interview with Stanford University biologist Stephen Schneider, he said that journalists

don't have to avoid the contrarians. I have never said to leave the contrarians out, but they have to make sure that there is a perspective on their relative credibility.

Connected to this, longtime journalist Robert Cowen said in an interview,

An obligation of the scientist is to interact with the public and to have a seat at the policy table... it has come front and center in scientist's education and professional life, even if they don't like to admit it.

Funtowicz and Ravetz (1990) have discussed such challenges as manifestations of post-normal science: arenas that are highly contested, characterised by uncertain facts, disputed values and politicised alternatives for action. Nisbet and Mooney have commented on the ongoing challenge of communicating scientific information on highly contested issues, noting that scientists generally are challenged to "'frame" information to make it relevant to different audiences' (2007, 56).

A number of interviewees also attributed the challenges involved in effective responses in part to inherent issues in their professions: scientists have a tendency to speak in cautious language when describing their research findings, and have

a propensity to discuss implications of their research in terms of probabilities. Moreover, scientists tend to qualify their findings in light of uncertainties that lurk in their research. For journalists and policy actors, these issues of caution, probability and uncertainty are all difficult to translate smoothly into crisp, unequivocal commentary often valued in communications and decisionmaking. For example, in peer-reviewed scientific journal articles, the professional culture of science trains authors to build the case of the research and then place key findings in the results and discussion sections; in professional media reports, journalistic norms instruct reporters to lead with the most important conclusions and discoveries. Through an interview, Malcolm Hughes – climate scientist at the University of Arizona – commented:

On one hand, the users of scientific information... sometimes people nurture this happy illusion of hard scientific facts and take that too far... on the other hand, we scientists in most cases will emphasize the condition clauses in any sentence because if you are close to the issue, you are aware of the scientific uncertainties in any statement that you make. Now that is a pretty bad combination if you put those two together! Because all the culture of the university and scientific societies is to hedge everything... we are a little too unwilling to say things as we see (them).

The second related factor/pressure is the challenge of dealing with uncertainty. Some have regarded the insertion of uncertainty in anthropogenic climate change discourse in science, as well as in the media, as a tactic deployed by intransigent policy actors to less concern for climate change (Williams 2000). Scientists often have difficulty placing the uncertainty associated with their research into a familiar context, through an appropriate analogy. While scientific uncertainty has entered debates regarding action (Zehr 2000), sometimes serving to inspire inaction (Demeritt 2001), it is an element central to all scientific inquiry. In another interview, University of Michigan Professor Henry Pollack said,

We are never going to have all the answers, and it is an illusion to wait for all the answers. In many cases, it is just a ploy to maintain the status quo for those who argue that we must have all the answers.

Research by Corbett and Durfee (2004) found that greater contextualisation within climate science stories helps to mitigate against controversy stirred up through uncertainty. However, in practice, the mass media have effectively amplified uncertainty

through coverage of climate contrarians' counter-claims regarding anthropogenic climate change, without providing context that these claims have been marginalised in the climate science community (Dunwoody 1999).

These dynamic challenges – shaping how anthropogenic climate change coverage is depicted in the media – can be explained through examinations of the contributions of multi-scale and multi-dimensional power. At the *macro* political-economic level, media consolidation shapes the news agenda in terms of concerns for efficiency and profitability of the organisation (Bennett 1996). A number of studies have explored how economic pressures and ownership structures have affected news content (e.g. Herman and Chomsky 1988). Additionally, deadlines and space considerations constrain journalists (Schudson 1978). For instance, tight deadlines can lead to stories that rely on just one source for information, and they can limit the ability of journalists to both comprehend and communicate complex climate science (Weingart *et al.* 2000). Moreover, editorial preferences and publisher pressures can affect news reporting (Schoenfeld *et al.* 1979). The amount of exposure and placement (front page or buried deep in the newspaper), as well as the use of headlines and photographs – which are often editorial decisions – can also affect how events and situations are construed by the public. Economic considerations have led to decreased mass-media budgets for investigative journalism (McChesney 1999). This trend has served to affect communications of scientific information when complex scientific material is simplified in media reports (Anderson 1997). Professor Malcolm Hughes commented in an interview, 'There is a huge gulf in the nature of the questions and concerns that come from journalists working very broadly'.

Moreover, these different communities have developed varying conceptions of time-scale in their professionalised cultures, and this also affects communications. In climate science, new insights are typically gained through longer-term iterative endeavours such as field research, modeling and peer-review processes. In climate policy, political cycles, negotiations and mobilisation of constituencies generally function in short- to medium-time scales. In journalism, 'breaking news', efficiency and profitability often pressure journalists to work on short-term time-scales. Also in terms of time-scale, structural constraints also play a critical role in hampering effective communications between

communities via the media. For example, in climate science – and more broadly, academia – it is well known that most reward systems are structured such that little is gained professionally through increased ‘non-academic’ pursuits such as media outreach. Conversely, much can be risked in terms of being misquoted about the implications of one’s research. In media and policy communities, there is immediacy in the need for policy-relevant information, and these disparate priorities lead to communication breakdowns. In addition, that corrections in media reporting – crucial to the precision of climate science – are placed in following days without much prominence is disconcerting for ongoing interactions between communities.⁹ Moreover, *New York Times* Science Editor Cornelia Dean said in an interview:

The scientific community needs to speak out more. It needs to acknowledge that scientists have an affirmative obligation as citizens to take part in the public debate in the country, and on the whole they have not done that... they often blame the media for not being prepared to go out and say things that they – who have the knowledge base – will not say in public.

Overall, these time-scale discrepancies contribute to continued troubles in translation of anthropogenic climate change.

This example demonstrates how these issues work across scales from macro-level political economic factors to micro-level processes. As another example, journalistic norms and pressures – such as objectivity, fairness and accuracy – intersect with these elements and shape news content. Prominently, the journalistic norm of ‘balanced reporting’ – in combination with other norms – has affected coverage of anthropogenic climate change (for more see Boykoff and Boykoff 2004; Boykoff 2007). The many micro-practices of journalism can serve to amplify asymmetrical power through providing coverage to a minority viewpoint, such as that espousing that humans have negligible effects on the climate. In an interview with journalist Dale Willman – veteran correspondent and field producer with *CNN*, *CBS News* and *National Public Radio* – he commented, ‘In terms of agenda-setting, the media don’t tell people what to think, but they tell them what to think about’.¹⁰ Much as storylines are fuelled within science and policy, the mass media play an important role in the ‘theatre’ of discursive structuration (Hajer 1995). Therefore, when covering this politicised arena, US newspaper and television media have

depicted a departure from the convergence of views in science over time regarding anthropogenic climate change. An interview with Robert McClure – journalist for the *Seattle Post-Intelligencer* – summed up these challenges by saying, ‘Because of the convention of the news business (writing about climate change) is difficult.’

A number of interviewees attributed the movement from convergence in climate science to conflict in media coverage partly to differing norms of knowledge production in each community. While difference is fetishised through the norms and rituals in each community (seeking to improve on the relevant corpus of knowledge), the expressions of this focus are divergent. The aforementioned peer-review process in science drives *how* (and what) assertions, results and conclusions reach print. Subject to multiple stages of reviews by peers and editors considered experts in the particular field(s) of inquiry, these reviewers assess the quality of the arguments, analyses and findings in a negotiated space typically before a given article finds its way into print. This does not remove conflict from print, but rather is a series of protections to *mitigate* against untested, out-of-context and inaccurate entries into the ongoing and unfolding scientific discourse. While imperfect, this process endeavours to impose safeguards and standards on contributions to the ongoing production of scientific knowledge. In journalism, while reporters and editors undergo associated negotiations in the pre-print stage, professionalised journalistic norms and standards instead *propel* conflict into print (for more see Boykoff and Boykoff 2007). This does not mean to suggest that potential contributions are scrutinised any less by experts in the field of journalism, but rather claims that through the differing norms of knowledge production, these communities move toward different expressions through assessment: in one case there is convergence, and in another there is contention.

So a tension continues between science and mass media. And, while science and policy clearly shape media reporting and public understanding, journalism and public concern also shape ongoing climate science and policy discourse. In other words, unequal power relations and their effects function in multiple directions. For example, deference to these journalistic standards at the sacrifice of context-specific critical analysis has far reaching effects. Pete Spotts – journalist for the *Christian Science Monitor* – commented in an interview, ‘If one is

simply adhering to the standards of journalism then (discontinuities) can happen by default'. When asked in an interview about multi-scale pressures and media reporting, Professor Stephen Schneider said, 'I don't think we are asking more of journalists than they can deliver, but we may be asking more of narrow corporate media than they can deliver'.

Moreover, at both macro- and micro-scales, unequal power relations intersect with bio-physical processes. Valuable research from political ecology has contested the assertion that nature is considered the backdrop upon which heterogeneous human actors contest and battle for epistemological and material successes (e.g. Blaikie and Brookfield 1987; Robbins 2001). For example, with anthropogenic climate change, assessments from the IPCC and elsewhere have interpreted biophysical processes through a scientific focus on changes in the *mean* of particular climate characteristics over time; estimations of future temperature changes on the planet are widely considered through these mean global atmospheric temperature readings. In the IPCC's 2001 report, climate scientists placed the expected global mean temperature increase in the range of 2.5°F (1.4°C) to 10.4°F (5.8°C) by 2100 (Houghton *et al.* 2001). This and other similar estimates of mean temperature change have been picked up by US mass media and have been included in numerous news reports on anthropogenic climate change over time. However, through a focus on changes in global *averages*, this epistemic framing runs an increased risk in climate policy decisionmaking by minimising considerations of potential non-linear and abrupt climate changes (Mastrandrea and Schneider 2004). Consequently, media coverage of nature's agency in response to human influences is then often subsumed by socio-political and economic concerns, such as how certain GHG reduction efforts may restrict economic activities. With such socio-political concerns at the fore, greater stress is placed on the danger of climate policy on trade and the economy, rather than also considering how trade and the economy may have detrimental effects on the global climate. Such partial readings of the complex problem then inevitably and preemptively constrict policy considerations.

Furthermore, challenges in translation are exacerbated by the complex bio-physical nature of climate change itself, noted by *New York Times* Environment Reporter Andrew Revkin as 'the classic incremental story'. Media studies researchers have asserted that,

Journalists are less adept at reporting complex phenomena... (and) have difficulty reporting stories that never culminate in obvious events. (Fedler *et al.* 1997, 94)

Moreover, journalists often focus reporting on events, which thus underemphasise these 'creeping' stories as well as the contexts within which they take place (McCright and Dunlap 2003). While scientific insights regarding complex issues such as anthropogenic climate change evolve over years and decades, through journalistic norms and pressures, media tends to take 'snapshot' selections from this steady stream of enhanced understanding, thus providing a truncated view of the issue. Therefore, through positivist epistemologies and concatenate framing, proposed movements towards solutions have been limited by this journalistic reporting.

An example of such framing through the media came through an opinion piece by James Schlesinger entitled 'Climate Change: The Science Isn't Settled', published in the *Washington Post* (Schlesinger 2003). Schlesinger is a former Director of the Central Intelligence Agency, former Secretary of Defense under Presidents Nixon and Ford and Secretary of Energy under President Carter. Also, among other roles he has been a member of the Board of Directors for Peabody Energy and Coal. Schlesinger drew on positivist framings through his assertions therein. In this op-ed, he deemphasised the influences of anthropogenic climate change through this focus on 'unsettled' science. Through the subtle wording and tone, the scientific uncertainty that arises from biophysical complexity was reframed as scientific confusion and incompetence. In this piece, while Schlesinger called for greater humility and tempered enthusiasms through greater deference to his constructions of history and assertions of disagreement, his statements were not contextualised by the fact that his singular comments – amplified by circulation in US mass media outlets – clearly contested consensus science on anthropogenic climate change. Economic and political interests aside, Schlesinger – much in line with current US federal administration climate policy – effectively turned the precautionary principle on its head and 'no regrets' policies inside out as he insisted that US climate change policy is best suited as a keep-waiting-to-see approach. This argumentative stance gained traction as its thinly veiled political economic and ideological interests appeared natural in form and content. When faced with the mounting scientific consensus on anthropogenic climate change, these comments were

flatly erroneous. However, that they went largely unchallenged in the US mass media, science and policy circles served to perpetuate this 'construction of non-problematicity', creating the appearance of greater debate and conflict where there is scientific convergence. Moreover, the instrumental rationality and modernist ontological position staked out by Schlesinger in the US media downplayed biophysical aspects of anthropogenic climate change, and contributed to confusion in policy decisionmaking and public perception of humans' role in climate change. Over time, in this milieu, science and policy have engaged in dialectical interactions while the US mass media has often dutifully re-presented and privileged certain discourses therein.

Conclusion

This research argues that US media have portrayed conflict and contentions rather than coherence regarding scientific explanations of anthropogenic climate change. Through analyses of *how* and *why* US media coverage of anthropogenic climate change has continued such reporting through time, it demonstrates that differences are not random. Rather, they are systemic and occur in two main and interrelated ways: first, through complex socio-political and economic reasons rooted in macro-power relations, as well as micro-processes that undergird professional journalism; and second, through innate biophysical characteristics that contradictorily shape knowledge and epistemic framings at multiple scales over time.

This study of US television and newspaper coverage of anthropogenic climate change informs connected fields of struggle. Intersecting with news media, a clear example has been the discursive traction gained through Michael Crichton's 2004 novel *State of Fear*. This was a tale about an antagonist and extremist environmental group peddling what he characterised as the 'myth' of anthropogenic climate change. While behind the veil of 'science fiction', Crichton provided highly selective referencing of climate science. This then provided a vehicle through which oppositional views – irrespective of their validity – could be smuggled or paraded into the policy and public sphere. For instance, former Chair of the US Senate Environment and Public Works Committee James Inhofe (Republican – Oklahoma) made it 'required reading' for committee members (Janofsky 2005). Moreover, in 2006 President George W. Bush (and Karl Rove) invited Crichton

into the White House to discuss climate policy (Janofsky 2006). Despite a veritable trailer-load of peer-reviewed work on anthropogenic climate change supporting this consensus view, systemic mobilisations of power and scale embodied in the success of this book thus fuelled an atmosphere of confusion. Also, in 2006 Crichton was awarded the American Association of Petroleum Geologists *journalism* award for his novel. This demonstrated how this book permeated discourses within US newspapers and television. This case also illustrated that while power influences the discourses within media, media power also feeds back into influences on policy and public understanding. In other words, Crichton empowered movements across scale, from individual perceptions to the perspectives of US federal powerbrokers regarding human contribution to climate change.

Thus, the construction of US climate change policy can be seen as manifestations of the complex interweaving of competing threads of meaning while tethered at varying lengths to science. Despite aforementioned institutional challenges, scientists need to re-invigorate initiatives to increase consistent contact with mass media to influence these contested discursive spaces with, in this case, anthropogenic climate change evidence. There are some fairly straightforward recommendations that can be made as first steps to take to improve media reporting on anthropogenic climate change. For example, more accurate yet succinct labelling of quoted sources in articles and segments – clarifying any scientific training or relevant funding sources – can help to better contextualise and situate comments made. However, aggregated together, the associated problems become more complex and daunting. What is needed is a fundamental re-evaluation of the role of science in informing environmental policy and practice via the media. Through reframing, power and scale are re-configured (or re-organised) and thus opened to new possibilities for climate change action (Swyngedouw 1992).

When the process of media framing – whereby meanings are constructed and reinforced – muddle rather than clarify scientific understanding of anthropogenic climate change, this can create spaces for US federal policy actors to defray responsibility and delay action regarding climate change. This work nests itself into larger 'cultural circuits' of climate change reflection and action (Carvalho and Burgess 2005), that is itself nested in multi-scale socio-political and biophysical influences. This

research has sought to take steps to unpack and examine forces of co-production and 'heterogeneous constructions' that innately undergird this problem (Demeritt 2001; Jasanoff 2004). In sum, this article seeks to more capably theorise as well as demonstrate empirically how the situated and influential role of the US mass media has generated public perception of lively and contentious debate amid convergent views in climate science.

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Notes

- 1 In other related climate science issues, such as the rate of temperature change, or the extent of connections between hurricane frequency and intensity and climate change, there is no clear consensus at present. Moreover, political questions such as who is responsible and what should be done about it remain highly debated issues.
- 2 For instance, the United Nations Framework Convention on Climate Change Conference of Parties Meetings (COPs), or James Hansen who is a NASA climate scientist.
- 3 Mass media has been broadly defined as the publishers, editors, journalists and others who constitute the communications industry and profession, and who produce, interpret and disseminate information, largely through newspapers, magazines, television, radio and the internet.
- 4 Thirty-six per cent said radio and 23 per cent mentioned internet. The percentages added to more than 100 per cent because many respondents consumed more than one source 'yesterday'.
- 5 The US mass media and policy actors often use the terms 'climate change' and 'global warming' interchangeably.
- 6 The Senate expressed discontent with the multi-phase approach to the Kyoto Protocol (delineated in the Berlin Mandate in 1995). The structure aimed for developed

countries – many with legacies of colonialism – to reduce emissions first, before developing countries followed with scheduled reductions.

- 7 This can be juxtaposed with US President George H.W. Bush's statement in 1990, 'We all know that human activities are changing the atmosphere in unexpected and in unprecedented ways' (Compton 1990).
- 8 Freudenberg (2000) discusses embedded power and leveraged legitimacy enabling privileged constructions of 'non-problematicity' in environmental issues more broadly.
- 9 Some argue that trends are changing and that increased visibility through media coverage has increased social status and even funding possibilities for researchers and scholars. While patterns may be shifting, current pressures still limit potential for more consistent media interactions and outreach activities. Interviewees consistently stated that interactions and outreach get ranked routinely below many other pressures.
- 10 This statement is reminiscent of one by Bernard Cohen in 1963 in reference to media coverage of foreign policy.

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