

*Communicating climate change in the
Anthropocene: the dynamic cultural
politics of climate change news coverage
and social media around the world*

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Chapter 18

Communicating Climate Change in the Anthropocene:

The dynamic cultural politics of climate change news coverage and social media around the world

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Introduction

Since the publication of the first edition of the *Routledge Handbook of Environment and Communication* in 2015, the world's coverage of climate change—both in terms of frequency and content—has changed substantially. The first iteration of this chapter detailed the decline of legacy media coverage of climate change in the years leading up to 2014, in tandem with digital and social media coverage beginning to step into these climate media spaces. Initially focusing on United States (US) coverage, we argued that this decline was ‘due largely to political economic trends of shrinking newsrooms and fewer specialist reporters covering climate stories with the same frequency as before’ (Boykoff et al. 2015: 221). As we stated at the time,

while [these trends provide] a worrisome glimpse into the contentious and high-stakes arena of global reporting on climate change in the twenty-first century, what it shows more generally is the way that environmental communication in the context of climate politics is thoroughly enmeshed in a combination of large-scale social, political and economic factors connected up with smaller-scale power-laden editorial decision making, steeped in cultural economy and ideology. (p. 222)

Yet one look at Figure 18.1, which now includes newspaper coverage of climate change up to 2021 at the global level, suggests that circumstances have changed. In short, there has been a relatively sustained rise in coverage between 2014 and 2021 in world coverage and in US newspapers in particular barring the large dip in coverage due to the finite ‘news hole’ of media attention focused on the COVID-19 pandemic (Figure 18.2).

January 2014 – April 2021 World Newspaper Coverage of Climate Change or Global Warming

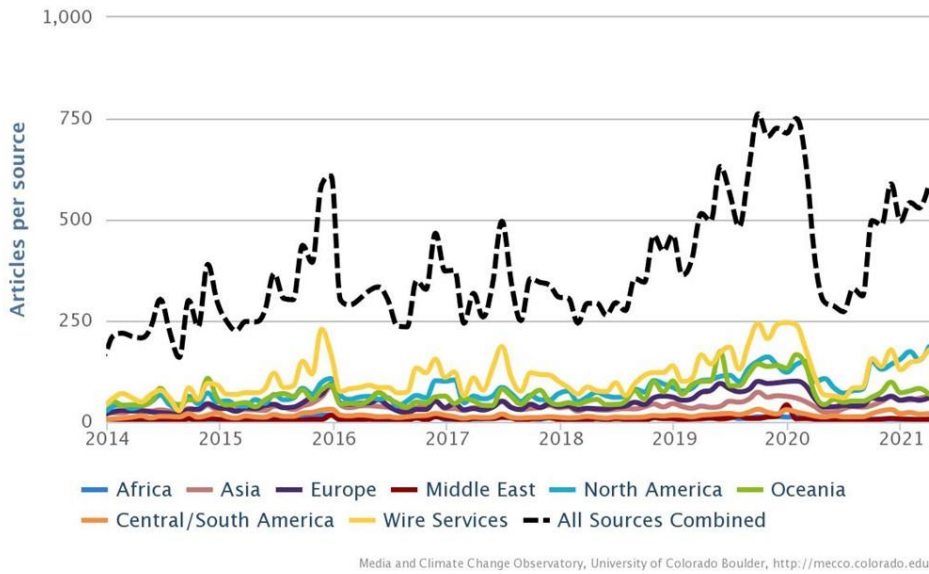


Figure 18.1

World newspaper coverage of climate change and global warming from 2014 to 2021. Source: Boykoff, M., Aoyagi, M., Ballantyne, A.G., Benham, A., Chandler, P., Daly, M., Doi, K., Fernández-Reyes, R., Hawley, E., McAllister, L., McNatt, M., Mocatta, G., Nacu-Schmidt, A., Oonk, D., Osborne-Gowey, J., Pearman, O., Petersen, L.K., Simonsen, A.H., and Ytterstad, A. (2021). World Newspaper Coverage of Climate Change or Global Warming, 2004-2021. Media and Climate Change Observatory Data Sets. Cooperative Institute for Research in Environmental Sciences, University of Colorado. doi.org/10.25810/4c3b-b819. https://sciencepolicy.colorado.edu/icecaps/research/media_coverage/world/index.html

January 2014 – April 2021 United States Newspaper Coverage of Climate Change or Global Warming

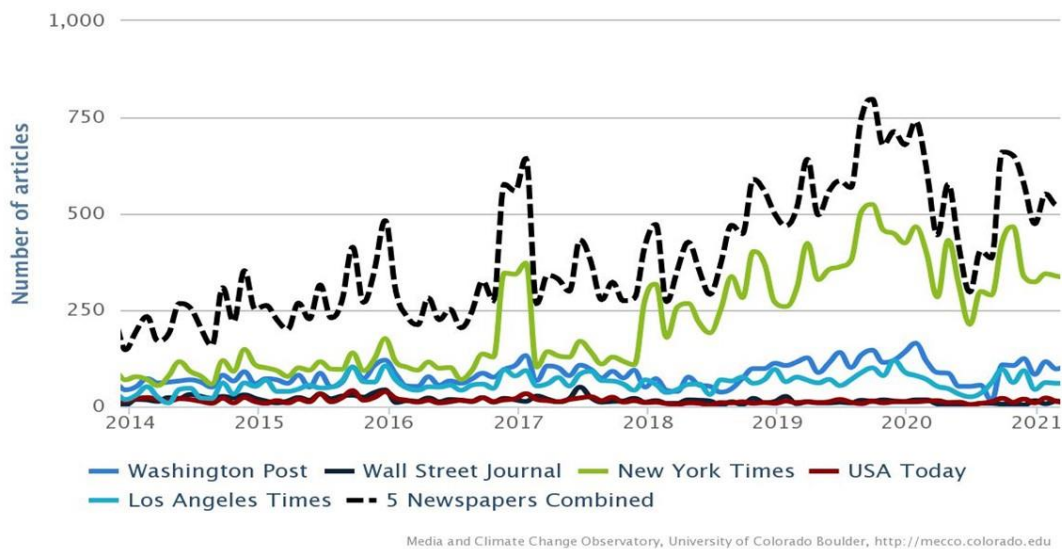


Figure 18.2

US newspaper coverage of climate change and global warming from 2014 to 2021. Source: Boykoff, M., Daly, M., McNatt, and Nacu-Schmidt, A. (2021). United States Newspaper Coverage of Climate Change or Global Warming, 2000-2021. Media and Climate Change Observatory Data Sets. Cooperative Institute for Research in Environmental Sciences, University of Colorado. doi.org/10.25810/jck1-hf50. https://sciencepolicy.colorado.edu/icecaps/research/media_coverage/usa/index.html

Amid newsrooms continuing to shrink or compress in many places (with some exceptions like the *Guardian* and *New York Times*), changing coverage can be attributed to several shifts in the media landscape. First, many stories about climate change or global warming increasingly populate pages *throughout* newspapers—from international or business sections to culture and sports stories—rather than being only covered in science or environment sections as in the past. Second, more reporting and coverage resulted from the growing awareness of the ‘intersectional’ nature of the challenges surrounding climate change. In other words, news accounts have increasingly moved from coverage of climate change or global warming as a single issue to many interrelated and interlocking challenges that thread throughout all aspects of everyday lives and livelihoods. Third, given these two conditions, more leaders—be they policy decision-makers or cultural figures—have spoken out about and acted on climate-related concerns garnering more coverage of these articulations and engagements. Fourth, global climate impacts and connections to other extreme events increasingly attributed to climate change have intensified media portrayals of climate challenges. Thus, although this is not an exhaustive list of key factors, resulting patterns of media representations—increasing in both quantity and quality—have illustrated that media have progressively had a hard time to *not* find and portray connections with a changing climate in the 21st century.

At this same time, the coverage, analysis and discussion of climate change has shifted significantly into digital spaces. Since 2014, there has been a rise and further entrenchment of digital news media sources, a deepening and broadening of climate change conversations on social media and the rise of key climate change voices in younger generations (e.g. Greta Thunberg), many of whom are digital media ‘originalists’ (Goodman and Jaworska 2020).

This chapter builds on our initial exploration of global climate change coverage, and also focuses on key questions that arise in light of the growing coverage of climate change from our previous writing on this topic in 2014. Since then, coverage across social and digital media representation has become a burgeoning space that has significantly shaped public awareness and engagement with climate change.

While some media conditions change, others have stayed the same

Most citizens around the world typically do not read peer-reviewed literature. Instead, to learn about climate change, people in the public arena turn to media communications—television, newspapers, radio, new and social media—to link formal science and policy with their everyday lives. Over the past several decades, the dynamics of science and politics have clearly shaped media coverage of climate change. Yet, it is also worth noting and considering how ‘news’—generated by mass media—has, in turn, shaped ongoing scientific and political considerations, deliberations and decisions. In other words, it is instructive to account for how mass media have influenced who has a say, when and how in the public arena.

“The media” around the world are actually much more heterogeneous and varied than at first glance. In their multiple dimensions, media are constituted by many institutions, processes and practices that together serve as “mediating” forces between communities such as science, policy and civil society. Media segments, articles, clips and pieces represent critical links between people’s everyday realities and experiences and the ways in which these are discussed at a distance between science, policy and public actors. People throughout society rely upon media representations to help interpret and make sense of the many complexities

relating to climate science and governance. Thus, media messages are critical inputs to what becomes public discourse on current climate challenges.

Yet, these media representations enter into an individual's pre-existing perceptions and perspectives, and are taken up or resisted in varied ways (Bolsen and Shapiro, 2017). For example, Dan Kahan (2013) has found that subtleties in messaging can activate strong ego-defensive attitudes as well as produce ineffective or even counter-productive results. Indeed, as Lorraine Whitmarsh (2011) put it in summarizing her research on climate contrarianism "attitudes to climate change are relatively entrenched and ... information about the issue will be evaluated and used in diverse ways according to individuals' values and worldviews." She concludes in a statement prescient of how some have similarly engaged with information about Covid-19 (e.g. Shephard et al 2020; Deane et al 2021):

[S]imply providing climate change information is unlikely to be successful, as new information is often interpreted by people in line with their existing attitudes and worldviews ... In other words, irrespective of how much information is provided, it is remarkably difficult to change attitudes that have become entrenched.
(Whitmarsh 2011: 698)

Together, media representations play distinct roles in shaping politically-, culturally-, environmentally- and socially-infused attitudes and behaviors (Gavin, 2018).

These dynamic science-policy-media-public interactions have been spaces where claim-makers in the media have been changing (e.g. Baum and Groeling 2008; Fahy and Nisbet 2011), and traditional media outlets have faced newfound challenges (Boykoff and Yulsman 2013; Siles and Boczkowski 2012) while shifts to new and social media tools have recalibrated who has a say and how these claims circulate (Baek et al. 2012; Cacciatore et al. 2012; Graham et al. 2013). Traditional and legacy media organizations themselves have worked to adapt to these changing conditions and researchers have increasingly sought to make sense of the shifts (e.g. Horan 2013; Nielsen 2012; Zhu and Dukes 2013) and their implications (e.g. Jacobson 2012) in various cultural, political, social and environmental contexts (e.g. Adams and Gwynnald 2013; Schuurman 2013).

In recent decades there has been significant expansion from traditional mass media into consumption of digital and social media. Essentially, in tandem with technological advances, this expansion in communications is seen to be a fundamental shift from broadcast, or "one-to-many" (often one-way) communications to "many-to-many" more interactive webs of communications (O'Neill and Boykoff 2010; van Dijk 2006). This movement has signaled substantive changes in how people access and interact with information about climate change and, who can create 'share-able' digital content and, importantly, who has access to this information, content and material.

As we have noted, traditional/legacy and digital/social media spaces together comprise a key part of what many refer to as the "cultural politics of climate change": dynamic and contested spaces where various actors, institutions and governments battle to shape public understanding and engagement (e.g. Goodman et al 2020; Boykoff and Goodman 2009). These are places where formal climate science, policy and politics operate at multiple scales, through multiple media forms and are dynamic as well as contested processes that shape how meaning is constructed and negotiated. In these spaces of the "everyday," cultural politics involve not only the discourses that gain traction in wider discourses, but also those that are

absent (Derrida 1978). Contemplating climate considerations in this way helps to examine “how social and political framings are woven into both the formulation of scientific explanations of environmental problems, and the solutions proposed to reduce them” (Forsyth 2003: 1).

Ongoing media attention in the public sphere

Figure 18.1 shows the trends in media coverage of climate change from 2014 into 2021 in one-hundred newspapers in 54 countries across the globe. Figure 18.2 focuses specifically on coverage in five US newspapers over this same time period. This visual representation provides an opportunity to assess and analyze further questions of how and why apparent ebbs and flows emerged in coverage. For instance, according to the annual summaries of coverage at the Media and Climate Change Observatory (MeCCO),¹ the increase in global coverage in late 2015 was attributed in large part to US and international political and economic activities and impacts emanating from the 2015 Paris Agreement, discussed and decided on in early December of that year. In 2016, the highly consequential US Presidential election of Donald J. Trump in November of that year motivated many US newspaper outlets to write stories of the impending impacts of his presidency on international as well as US-based policy engagements with climate and environment challenges. As such, US media attention in mid-2017 was often linked to Trump’s withdrawal from the 2015 UN Paris Climate Agreement and the US move to isolation through the G7 summit a few weeks later. US climate change coverage also rose with the inauguration of Trump and the impending sense of doom surrounding this and the Trump administration’s general approach to environmental issues. 2018 saw an uptick in coverage in October of that year given the attention paid to the UN’s IPCC Special Report on the impacts of 1.5C warming as well as coverage of Hurricane Michael landing in Florida, Typhoon Yutu in the Mariana Islands and the continued clean-up efforts from Typhoon Mangkhut in the Phillipines and Hurricane Florence in the Carolinas. This year was also defined by the ‘Trump Dump’ in US coverage: news media’s focus on Trump-related stories lessened and/or pushed out news stories about climate change, to the detriment of the coverage of all other issues on climate-related topics or events. While news coverage of climate change in the US was not solely driven by US President Trump’s rollbacks or negligence in regard to climate and environment policies, his imprint was clearly detected in media coverage of climate change or global warming during those years. For example, throughout the year 2017, in terms of the frequency of words in articles in the US, ‘Trump’ was invoked 19,184 times through 4117 stories in *The Washington Post*, *The Wall Street Journal*, *The New York Times*, *USA Today*, and the *Los Angeles Times* in 2017 (a ratio of nearly 4.7 times per article on average). Figure 18.3 depicts word frequencies in US press accounts across the calendar year 2017 (Boykoff et al 2017).

¹ https://sciencepolicy.colorado.edu/icecaps/research/media_coverage/summaries/

coverage was up 34% compared to 2018, 41% higher than 2017, 38% higher than 2016 and 24% up from 2015. In fact, 2020 ranks second in terms of the amount of coverage of climate change or global warming (behind 2019) since the monitoring by MeCCO began 17 years ago in 2004 (Boykoff et al 2021). Even with the obvious Covid-19 drop in climate coverage in the early to middle part of 2020, climate change nonetheless did not disappear from global-scale public conversations. From Arctic and Antarctic ice loss to Zimbabwe locusts, reports connecting these dots with a changing climate drove media coverage. These were interwoven with stories of Australian and North American wildfires, floods in Bhutan, Bangladesh, Nepal, Sri Lanka and the UK, rainforest retreat in Congo and Russian heatwaves. Further ecological and meteorological accounts linked to climate change included cyclones Nivar and Amphan, tropical storms Nangka and Saudel, typhoons Molave and Goni and hurricanes Nana, Eta and Iota. Political and economic-themed stories in 2020 included decarbonization and renewable energy growth, as well as corporate pledges for emissions reductions and BlackRock divestment plans. Other key events included the US Trump Administration regulatory rollbacks and climate policy (in)action as well as the consequential November 2020 US Presidential election. Many scientific-themed coverage throughout the year included record-breaking global temperatures and a new understanding of intersectional climate challenges (e.g. links between COVID-19 and climate change) and humans' role in them. Moreover, many cultural stories relating to climate change punctuated 2020, from Greta Thunberg and #FridaysforFuture demonstrations as well as ongoing pipeline protests, *Guardian* style-guide changes to climate coverage and Covering Climate Now² initiatives.

Across this nearly eight-year look, there is asymmetrical coverage by geographical region: not every place has seen an increase in media climate change stories. For example, similar to our discussion of coverage up to 2014, there continued to be a relatively low number of stories on climate change or global warming in the regions of South America, the Middle East and Africa throughout this period and up to 2021. This points to a critical regional “information gap” in reporting on these issues—that problematically continues to this day—and relates to media capacity issues and support for reporters in these regions and countries, many of which are and remain on the economic margins.

Climate coverage at the intersections of multiple contexts, themes and power relations

Tracking media treatment of climate change and global warming through intersecting *political*, *scientific* and *ecological/meteorological* climate themes provides a useful framework for analyses of content and context. Such accounting helps to demonstrate how news pieces should not be treated in isolation from one another. Rather, they should be considered as intimately connected to larger political, economic, social, environmental and cultural conditions and processes.

Moreover, patterns revealed in the mobilizations of journalistic norms internal to the news-generation process cohere with externally influenced dominant market-based and utilitarian approaches that consider the spectrum of possible mitigation and adaptation action on climate change. Robert Brulle has argued that an excessive mass media focus merely on debating individual ‘characters’ and their claims, “works against the large-scale public engagement necessary to enact the far-reaching changes needed to meaningfully address global warming” (2010, p. 94). As such, examinations of the content of media treatment of climate change need to be considered within a context of larger political and social forces.

² <https://coveringclimatenow.org/>

The cultural politics of climate change reside in many spaces and places, from workplaces to pubs and kitchen tables. Actors on this stage range from fellow citizens to climate scientists as well as business industry interests and ENGO activists. Over time, individuals, collectives, organizations, coalitions and interest groups have sought to access the power of mass media to influence architectures and processes of climate science, governance and public understanding through various media *frames* and *claims*. Questions regarding “who speaks for the climate” involve considerations of how various perspectives—from climate scientists to business industry interest and ENGO activists—influence public discussions on climate change (Boykoff 2011; see also Boykoff 2019). Actors, agents, and/or operatives in this theatre are ultimately all members of a collective public citizenry. However, differential access to media outlets across the globe are products of differences in power, and power saturates social, political, economic and institutional conditions undergirding mass media content production (Wynne 2008).

In the highly contested arena of climate science and governance, different actors have sought to access and utilize mass media sources in order to shape perceptions on various climate issues contingent on their perspectives and interests. For example, “contrarians,” “sceptics,” “denialists,” and “obfuscators” have had significant discursive traction in the US public sphere over time (Leiserowitz et al. 2013), particularly by way of media representations and discourses (Boykoff 2013). Specifically, resistances to both diagnoses of the causes of climate change and prognoses for international climate policy implementation have often been associated with the political right in the US, including a wide swath of the Republican Party and the right-wing faction within it known as the “Tea Party” (Dunlap 2008). More contemporary iterations of this faction include “Make American Great Again” (MAGA) acolytes and the so-called ‘Denialist-in-Chief’ in past US president Donald Trump who has continued to call climate change either ‘fake news’ or a ‘hoax’. John Broder of the *New York Times* described this right-of-center US political party stance as an “article of faith”, and polling data have shown that “more than half of Tea Party supporters said that global warming would have no serious effect at any time in the future, while only 15% of other Americans share that view” (2010: A1). More recent research (Leiserowitz et al. 2021) suggests that in a national survey, of those polled, only 30% of self-identified moderate Republicans and 12% feel that global warming should be a ‘high’ to ‘very high’ priority, although many did support green energy policies, infrastructure and conservation. This suggests interesting complexities across climate change as an ideological concern and material support of responses to it.³ Moreover, while carbon-based industry interests have exerted considerable influence over US climate policy, associated scientists and policy actors who have questioned the significance of human contributions—often dubbed “climate contrarians”—have been primarily housed in North American universities, think tanks and lobbying organizations (Dunlap 2013; McCright 2007). In particular, US-based non-nation state organizations such as the Heartland Institute and the American Enterprise Institute (AEI) have held numerous meetings to promote contrarian views on climate science and policy (Boykoff and Olson 2013; Hoffman 2011).

Contributions to climate storytelling through news

Climate change is a complex and multifaceted issue that cuts to the core of the human relationship with the environment. The cultural politics of climate change are situated, power-

³ See Leiserowitz et al. (2021) for in-depth data analysis of beliefs and response to climate change by political party in the US.

laden, media-led and recursive in an ongoing battlefield of knowledge and interpretation (Boykoff et al. 2009; Goodman et al 2020). Mass media link these varied spaces together, as powerful and important interpreters of climate science and policy, translating what can often be alienating, jargon-laden information for the broadly construed public citizenry. Media workers and institutions powerfully shape and negotiate meaning, influencing how citizens make sense of and value the world.

In various cultural, political, social, economic and environmental contexts, journalists, producers and editors as well as scientists, policy makers and non-nation state actors must scrupulously and intently negotiate how climate is considered a “problem” or a “threat,” or as in more recent framings, an “opportunity” for green jobs, economic growth and infrastructure investment (e.g. Sullivan and White 2020; Stecula and Merkley 2019). As part of this process, it has been demonstrated that media reports have often conflated the vast and varied terrain—from climate science to governance, from consensus to debate—as unified and universalized issues (Boykoff 2011). As a consequence, these representations can confuse rather than clarify: they can contribute to ongoing illusory, misleading and counterproductive debates within the public and policy communities on critical dimensions of the climate issue.

To the extent that media fuse distinct facets into climate gestalt—by way of “claims” as well as “claims makers”—collective public discourses, as well as deliberations over alternatives for climate action, have been poorly served. Media focusing on an area of climate change that contains scientific nuances and uncertainties, such as the degree to which an extreme weather event is the result of climate change, may result in a specious conclusion that more knowledge is needed before taking action on climate change.

Regarding “claims makers,” efforts to make sense of complex climate science and governance through media representations involves decisions regarding who the “experts” or “authorities” are who speak for climate. This is particularly challenging when covering climate change, where indicators of climate change—such as sea level rise, temperature shifts, changing rainfall patterns—may be difficult to detect and systematically analyze (Andreadis and Smith 2007). Moreover, in the advent and increasingly widespread influence of new and social media—along with fewer formalized “gatekeepers” in content generation—the identification of “expertise” can be more, rather than less, challenging. The abilities to quickly conduct a Google or Bing search for information is in one sense very liberating and often driven by the MAGA climate-denying crowd’s exhortations to ‘do your own research’ (Siegel 2020). Yet, in another sense, this unfiltered access to complex information also intensifies possibilities of short-circuiting peer review processes (and determinations by “experts”), and can thereby do an “end-run around established scientific norms” (McCright and Dunlap 2003: 359). In other words, these developments have numerous and potentially paradoxical reverberations through ongoing public discourses on climate change.

There are many reasons why media accounts around the world routinely fail to provide greater nuance when covering various aspects of climate change. Central among them, the processes behind the building and the challenging of dominant discourses take place simultaneously at multiple scales. Large-scale social, political and economic factors influence everyday individual journalistic decisions, such as how to focus or contextualize a story with quick time to deadline. These issues intersect with processes such as journalistic norms and values (e.g. Boykoff 2011), citizen and digital journalism (e.g. O’Neill and Boykoff 2010), and letters to the editor (e.g. Young 2013) to further shape news narratives. Moreover, path

dependence through histories of professionalized journalism, journalistic norms and values as well as power relations have shaped the production of news stories (Starr 2004). These dynamic and multiscale influences are interrelated and difficult to disentangle: media portrayals of climate change are infused with cultural, social, environmental and political economic elements, as well as how media professionals must mindfully navigate through hazardous terrain in order to fairly and accurately represent various dimensions of climate science and governance (Ward 2008).

Overall, media representations are derived through complex and non-linear relationships between scientists, policy actors and the public that is often mediated by journalists' news stories (Carvalho and Burgess 2005). In this, multi-scalar processes of power shape how mass media depict climate change. Processes involve an inevitable series of editorial choices to cover and report on certain events within a larger current of dynamic activities, and provide mechanisms for privileging certain interpretations and "ways of knowing" over others. Resulting images, texts and stories compete for attention and thus permeate interactions between science, policy, media and the public in varied ways. Furthermore, these interactions spiral backward and forward into ongoing media representations. Through these selection and feedback processes, mass media have given voice to climate itself by articulating aspects of the phenomenon in particular ways, via claims makers or authorized speakers. In other words, through the web of contextual and dynamic factors, the stream of events in our shared lives gets converted into finite news stories that can only and ever be partial, unfished and context dependent. Thus, constructions of meaning and discourse on climate change are derived through combined structural and agential components that are represented through mass media to the general public.

The Greta Thunberg Effect: The continuing rise of #climateneews through digital and social media

Embedded in this dynamism is the ongoing and burgeoning influence of digital and social media. With it comes numerous questions: does increased visibility of climate change in digital and social media translate to improved communication or just more noise that audiences must sift through and filter? Do these spaces provide opportunities for new forms of deliberative communities regarding questions of climate mitigation and adaptation (e.g. Harlow and Harp 2013; Rogers 2004) and conduits to offline organizing and social movements (e.g. Jankowski 2006; Tufekci 2013)? Or has the content of this increased coverage shifted to polemics and inflammatory arguments over measured analysis? In this democratized space of content production, do digital and social media provide more space for contrarian views to circulate or less? And through its interactivity, does increased consumption through social media further fragment a public discourse on climate mitigation and adaptation through the cementing of information silos where members of the public algorithmically stick to sources that support their already held views (e.g. Hestres 2013; Yang and Kahlor 2012)?

While many of these questions have yet to be answered or analyzed in light of climate change discourses and representations in the context of social media, the recent rise of Greta Thunberg, youth climate strikes (#climatestrike) and marches and the #fridaysforfuture⁴ 'movement' on Twitter, Facebook and Instagram suggests interesting novel dynamics across the climate politics of the digital world and those in the 'real world'. Pitched as an 'ordinary'

⁴ www.fridaysforfuture.org

environmental celebrity in that she rose from relative obscurity to global celebrity status (Abadin et al 2020), Thunberg vaulted from her lone climate strike outside of the Swedish parliament in 2018, to become a social media sensation through legacy, digital and social media coverage. Thunberg rise, and the social media campaigns that rapidly picked her up as a new climate change icon (Olesen 2020), resulted in the crystallization of a global youth movement for climate change activism that culminated in global climate strikes and a series of marches in the spring and summer of 2019. What is being called the ‘Greta Thunberg Effect’ (Sabherwal et al 2020; see also Murphy 2021) saw the recursive flowering of online and real world activism with millions partaking in marches, protest, strikes and tweets, retweets, likes and posts across hundreds of countries. Through her shout of ‘how dare you!’ at the UN climate summit—which quickly became ‘meme-fied’ and swiftly traversed the digital world—Thunberg vaulted climate change and youth engagement with it onto the world stage in crucial ways, with some suggesting her digital youth movement not only impacted climate policy (Watts 2019) and coverage but also laid the critical groundwork for positioning climate activism as civic engagement and democracy across multiple generations (Fisher 2019).

Yet, importantly, Sharon Dunwoody has cautioned us to not view various modes of media production equally. As she puts it,

... because of their extensive reach and concomitant efficiencies of scale, mediated information channels such as television and newspapers have been the traditional channels of choice for information campaigns. But research on how individuals actually use mass media information suggests that these channels may be better for some persuasive purposes than for others (quoted in Boykoff, 2009: 2).

Trends in carrying these creative communications through new and social media unfold in the context of a wider and fundamental set of questions involving how these mediatized communications may take place in echo chambers or whether they open up novel discussions, considerations and behaviors (e.g. Tandoc and Eng, 2017; Anderson, 2017). Michael Shank (2017, p. 14) from the Carbon Neutral Cities Alliance has argued that social media memes are key to successful climate communications. He stated that “if we can’t translate a meaty message for the myriad social media vehicles out there, we haven’t tried hard enough”.

Meanwhile, social science and humanities research into digital behaviors and communication about climate change in the US, the United Kingdom, Germany, India and Switzerland has revealed useful insights. Among them, Walter et al. (2018) found that users mainly stuck with their referent groups, forming insulated conversations rather than engagement across different social, political and cultural perspectives. They explained that online media comment sections thereby “serve as echo chambers rather than as corrective mechanisms” and consequently when “climate-skeptical readers find information that is consistent with their own beliefs...[it] hence gives them the impression that their opinion is the prevalent one in society” (pp. 213-214). Moreover, contrarian organizations have found that by bidding on search terms like ‘climate change’ on Google, this then raises the profile of their content in search engine results (Tabuchi, 2017). Regarding the toxicity of fake comments in internet comment sections and chat rooms, Chen (2018, B7) has commented that “there’s not much you can do” and “the real leverage lies with the tech companies”.

YouTube, with more than two billion users worldwide in 2021 and viewers consuming a billion hours on the platform each day, coupled with the Autoplay feature that automatically

plays another related video based on a user's viewing history (albeit, a feature that one can turn off), suggests another “echo chamber” arena. Indeed, analyzing the content of comments from the most popular climate change-related videos on YouTube, Shapiro and Park (2018) found that in post-video discussions, climate change activists and sceptics are “tapping into a reservoir of pre-existing beliefs,” and that post-video discussions were driven by a small groups of individuals, many of whom were standing for or against climate change-related action (pp. 126-127). Outside of YouTube, Lewandowsky et al. (2019), looked at blog posts that did, or did not support the scientific consensus on climate change and their comment sections. They found that “readers may be nudged towards rejection of climate science if they encounter a stream consisting of contrarian comments” (p. 1453), a finding of particular significance given that there are estimated to be tens of millions of active blogs in the US alone.

Such considerations of social media also prompt us to reassess boundaries between who constitute “authorized” speakers (and who do not) in mass media as well as who are legitimate “claims-makers.” These are consistently being interrogated and challenged (Gieryn 1999; Loosen and Schmidt 2012). Lewandowsky et al. (2019) analyzed the ways in which internet news services are addressing the concern that a small fraction of readers who leave comments can leverage public opinion about scientific issues, including moderating comments, discontinuing comments, and, in one Norwegian site in particular, requiring readers to pass a comprehension quiz prior to leaving comments. Leiserowitz (2005: 149) has written that these arenas of claims-making and framing are “exercises in power... . Those with the power to define the terms of the debate strongly determine the outcomes.” These factors have produced mixed and varied impacts: journalist Alissa Quart (2010) has warned of dangers of mistaken, or convenient, reliance on “fauxperts” instead of “experts,” and Boykoff (2013) and Boykoff and Farrell (2019) have examined these dynamics as they relate to amplified media attention to “contrarian” views on various climate issues.

Conclusions

Connections between media information and policy decision making, perspectives and behavioral change are far from straightforward (Vainio and Paloniemi 2013). Coverage certainly does not determine engagement. Rather, it shapes engagement possibility in quantity, quality, depth and effect (Boykoff 2008; Carvalho and Burgess 2005). Our explorations of media coverage of climate change around the world and in the US in this updated chapter seek to help readers better understand the dynamic web of influence that media play amidst many others that shape our attitudes, intentions, beliefs, perspectives and behaviors regarding climate change. As we have posited here, media representations—from news to entertainment, from broadcast to digital, interactive and participatory—are critical links between people's perspectives and experiences, and the ways in which dimensions of climate change are discussed at a distance between science, policy and public actors.

The road from information acquisition via mass media to various forms of engagement and action is far from straightforward, and is filled with turns, potholes and intersections. This is a complex arena: mass media portrayals do not simply translate truths or truth-claims nor do they fill knowledge gaps for citizens and policy actors to make “the right choices.” Moreover, media representations clearly do not dictate particular behavioral responses. For example, research has shown that fear-inducing and catastrophic tones in climate change stories can inspire feelings of paralysis through powerlessness and disbelief rather than motivation and engagement. Andrew Hoffman has said, “typically, if you really want to mobilize people to

act, you don't scare the hell out of them and convince them that the situation is hopeless" (Ryzik, 2017). But with other audiences and people, fear can inspire motivation and a willingness to take action in the face of climate threats. Chapman et al. (2017: 848) have observed that "the bifurcation between 'go positive' and 'go negative' simultaneously oversimplifies the rich base of research on emotion while overcomplicating the very real communications challenges advocates face by demanding that each message have the right 'emotional recipe' to maximize effectiveness." In addition, O'Neill et al. (2013) found that imagery connected with climate change influences saliency (that climate change is important) and efficacy (that one can do something about climate change) in complex ways in their study across the country contexts of Australia, the US and United Kingdom. Among their results, they found that imagery of climate impacts promoted feelings of salience, but undermined self-efficacy, while imagery of energy futures imagery promoted efficacy. Further research has found that imagery can grab attention, promote comprehension, create awareness, change beliefs, and reshape intentions, perspectives, reasoning and behavior (Hansen and Machin, 2008; O'Neill, 2017). Overall, media portrayals continue to influence—in non-linear and dynamic ways—individual to community- and international-level perceptions of climate science and governance (Wilby 2008). In other words, mass media have constituted key interventions in shaping the variegated, politicized terrain within which people perceive, understand and engage with climate science and policy (Schäfer and Painter 2021).

Over time, many researchers and practitioners have vigorously debated the extent to which media representations and portrayals are potential conduits to attitudinal and behavioral change (e.g. Dickinson et al. 2013). Nonetheless, as unparalleled forms of communication in the public arena, research into media representational practices remains vitally important in terms of how they influence a spectrum of possibilities for governance and decision making. As such, media messages—and language choices more broadly (Greenhill et al. 2013)—function as important interpreters of climate information in the public arena, and shape perceptions, attitudes, intentions, beliefs and behaviors related to climate change (Boykoff 2011; Hmielowski et al. 2013). Studies across many decades have documented that citizen-consumers access understanding about science and policy (and more specifically climate change) largely through media messages (e.g. Antilla 2010; O'Sullivan et al. 2003).

Furthermore, mass media comprise a community where climate science, policy and politics can readily be addressed, analyzed and discussed. The way that these issues are covered in media can have far-reaching consequences in terms of ongoing climate scientific inquiry as well as policy maker and public perceptions, understanding and potential engagement. In this contemporary environment, numerous actors compete in these media landscapes to influence decision making and policy prioritization at many scales of governance. Multitudinous ways of knowing—both challenged and supported through media depictions—shape ongoing discourses and imaginaries, circulating in various cultural and political contexts and scales. Furthermore, varying media representational practices contribute, amid a complex web of factors, to divergent perceptions, priorities and behaviors.

More media coverage of climate change—even fair and accurate portrayals—is not a panacea nor is it always good (see the 'Trump Dump' above). This is clear from the increase of coverage shown in Figures 18.1 and 18.2 and the fact that, even with the lack of emissions due to global Covid-19 lockdowns, atmospheric CO₂ levels continue to rise (Harvey 2020) and are approaching concentrations seen 15 million years ago when sea levels were 20 meters higher than today (Watts 2020). In fact, increased media attention to the issue often unearths

more questions to be answered and greater scientific understanding can contribute to a greater supply of knowledge from which to develop and argue varying interpretations of that science (Sarewitz 2004). At best, media reporting helps address, analyze and discuss the issues, but not answer them: dynamic interactions of multiple scales and dimensions of power critically contribute to how climate change is portrayed in the media. As we have detailed above, mass media representations arise through large-scale (or macro) relations, such as decision making in a capitalist or state-controlled political economy and individual-level (or micro) processes such as everyday journalistic and editorial practices and the rise of digital social media movements.

The contemporary cultural politics of climate change thread through a multitude of rapidly expanding spaces. Within this, the media serve a vital role in communication processes between science, policy and the public. The influence of media representations as well as creative and participatory communications—nested in cultural politics more broadly—can be ignored or dismissed in shaping climate science and governance at our peril.

Further reading

Boykoff, M. (2019) *Creative (climate) communications: Productive pathways for science, policy and society*. Cambridge: CUP

This book integrates lessons from the social sciences and humanities to more effectively make connections across climate change issues, people and things that everyday citizens care about. There is no ‘silver bullet’ to communications about climate change. Instead, a ‘silver buckshot’ approach is needed, where strategies effectively reach different audiences in different contexts. This tactic can then significantly improve efforts that seek meaningful, substantive, and sustained responses to contemporary climate challenges. It can also help to effectively recapture a common or middle ground on climate change in the public arena. Boykoff suggests ideas on how to harness creativity to better understand what kinds of climate communications work where, when, why, and under what conditions in the twenty-first century.

Mann, M (2021) *The new climate war: The fight to take back our planet*. London: PublicAffairs

This book confronts the usual ways in which climate change causes and consequences are discussed through individual actions. With several decades of experience researching and discussing climate science and policy, Mann outlines important dimensions of fossil fuel distractions and delay tactics that have impeded the scale of engagements that are needed to more effectively and necessarily meet climate change challenges. Mann focuses on interactions at the collective scale as he outlines plans for accountability for both governments and corporations in order to catalyze large-scale and systemic changes needed to equitably and effectively address 21st century climate change and its current and impending impacts.

Corner, A. and Clarke, J. (2017). *Talking climate: From research to practice in public engagement*. London: Palgrave.

The question of how to communicate about climate change and build public engagement in high-consuming, carbon-intensive Western nations, has occupied researchers, practitioners,

and campaigners for more than two decades. Corner and Clarke describes a novel approach to climate change communication: five core principles for public engagement that can propel climate change discourse out of the margins and into the mainstream. By spanning the full width of the space between primary academic research and campaign strategies on climate communication, this book will be relevant for a wide audience of academics, educators, campaigners, communicators and practitioners.

Doyle, J. (2011). *Mediating climate change*. New York, NY: Routledge.

This book confronts how nature and the environment have been problematically separated from humans and culture. By interrogating how climate change becomes meaningful in our lives, Doyle explores how imagery shapes our understanding, and how climate mitigation efforts in particular relate to our food consumption choices, support for social movements, and commitments to creative experimentation and engagement. In the interstices of climate science, culture and society, Doyle examines how mediation and visualization—as intensely values-laden processes—shape how we consider and respond to climate challenges.

Moser, S.C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: what more is there to say? *Wiley Interdisciplinary Reviews: Climate Change*, 7(3), pp. 345-369. doi: 10.1002/wcc.40

This paper focuses on academic contributions to climate communications since a similar stock-taking exercise in 2010. In it, the article delineates significant advances, emerging trends and topics, and tries to chart critical needs and opportunities going forward. New challenges and topics have emerged that communication researchers and practitioners now face in the context of climate change. Moser reflects on the crucial need to improve the interaction between climate communication research and practice, and calls for dedicated science practice boundary work focused on climate change communication. A set of new charges to climate communicators and researchers are offered in hopes to move climate change communication to a new place, at once more humble yet also more ambitious than ever before, befitting to the crucial role it could play in the cultural work humanity faces with climate change.

Pezzullo, P.C. and Cox, R. (2018). *Environmental communication and the public sphere*. Fifth edition. London: SAGE Publications.

The fifth edition of this book focuses on the role that human communication plays in influencing the ways we perceive the environment, including the climate and climate change. In particular, it examines how we define what constitutes an environmental problem and how we decide what actions to take concerning the natural world. Pezzullo and Cox offer insights into the news media, environmental policy and politics, environmental conflict, advocacy campaigns, and other real-world applications of environmental communication. This latest edition explores recent events—the Trump Administration, wolf conservation, public land milestones, the Flint water crisis, corporate disinformation campaigns, new alliances for a “just transition” in a growing renewable energy economy, the People’s Climate March, international legal precedents, and other topics—to illustrate key terms and the significance of environmental communication.

References

- Abidin, C., Brockington, D., Goodman, M. K., Mostafanezhad, M., & Ann Richey, L. (2020). The Tropes of Celebrity Environmentalism. *Annual Review of Environment and Resources*, 45(1), annurev-environ-012320-081703. <https://doi.org/10.1146/annurev-environ-012320-081703>
- Adams, P. C. and Gynnild, A. (2013) “Environmental messages in online media: The role of place,” *Environmental Communication: A Journal of Nature and Culture* 7(1), 103, 113–130.
- Anderson, A.A. (2017). *Effects of Social Media Use on Climate Change Opinion*. Oxford Research Encyclopedia of Climate Science, 2, pp. 486-500.
- Andreadis, E. and Smith, J. (2007) “Beyond the ozone layer,” *British Journalism Review* 18(1), 50–56.
- Antilla, L. (2010) “Self-censorship and science: A geographical review of media coverage of climate tipping points,” *Public Understanding of Science* 19(2), 240–256.
- Baek, Y. M., Wojcieszak, M., and Delli Carpini, M. (2012) “Online versus face-to-face deliberations: Who? Why? What? What effects?” *New Media and Society* 14(3), 363–383.
- Baum, M. A. and Groeling, T. (2008) “New media and the polarization of American political discourse,” *Political Communication* 25(1), 345–365.
- Bolsen, T. and Shapiro, M.A. (2017). *Strategic Framing and Persuasive Messaging to Influence Climate Change Perceptions and Decisions*. Oxford Research Encyclopedia of Climate Science, 3, pp. 491-508.
- Boykoff, M. (2008) “The cultural politics of climate change discourse in UK tabloids,” *Political Geography* 27(5), 2008, 549–569.
- Boykoff, M. (2009) “A discernible human influence on the COP15? Considering the role of media in shaping ongoing climate science,” *Copenhagen Climate Congress Theme 6, Session 53*.
- Boykoff, M. (2011) *Who Speaks for Climate? Making Sense of Mass Media Reporting on Climate Change*, Cambridge: Cambridge University Press, 240 pp.
- Boykoff, M. (2013) “Public Enemy no.1? Understanding media representations of outlier views on climate change,” *American Behavioral Scientist* doi:10.1177/0002764213476846.
- Boykoff, M. and Farrell, J. (2019) ‘Climate Change Countermovement Organizations and Media Attention in the United States’ *Climate Change Denial and Public Relations. Strategic Communication and Interest Groups in Climate Inaction* (Almiron, N. and Xifra, J. [eds]) Routledge, London, pp. 121-139.
- Boykoff, M. and Goodman, M. K. (2009) “Conspicuous redemption? Reflections on the promises and perils of the ‘celebritization’ of climate change,” *Geoforum* 40, 395–406.

- Boykoff, M. and Yulsman, T. (2013) “Political economy, media and climate change: The sinews of modern life,” *Wiley Interdisciplinary Reviews: Climate Change*, doi: 10.1002/wcc.233.
- Boykoff, M. T. and Nacu-Schmidt, A. (2013) *Media coverage of climate change/global warming*, Cooperative Institute for Research in Environmental Sciences, Center for Science and Technology Policy Research, Retrieved: http://sciencepolicy.colorado.edu/media_coverage
- Boykoff, M., McNatt, M., & Goodman, M. (2015). Communicating in the Anthropocene: the cultural politics of climate change news coverage around the world. In A. Hansen & B. Cox (Eds.), *The Routledge Handbook of Environment and Communication* (pp. 221–232). London: Routledge.
- Boykoff, M., Goodman, M. K., and Curtis, I. (2009) “Cultural politics of climate change: Interactions in everyday spaces,” in M. Boykoff (Ed.), *The Politics of Climate Change: A Survey*, London: Routledge/Europa, pp. 136–154.
- Boykoff, M., P. Church, J. Katzung, A. Nacu-Schmidt, and O. Pearman (2021). A Review of Media Coverage of Climate Change and Global Warming in 2020. Media and Climate Change Observatory, Cooperative Institute for Research in Environmental Sciences, University of Colorado. http://sciencepolicy.colorado.edu/icecaps/research/media_coverage/summaries/special_issue_2020.html
- Broder, J. M. (2010) “Skepticism on climate change is article of faith for tea party”, *The New York Times*, October 21, A1.
- Brüggemann, M., & Engesser, S. (2017). Beyond false balance: How interpretive journalism shapes media coverage of climate change. *Global Environmental Change*, 42, 58-67.
- Brulle, R. J. (2010) “From environmental campaigns to advancing a public dialogue: Environmental communication for civic engagement,” *Environmental Communication: A Journal of Nature and Culture* 4(1), 82–98.
- Cacciatore, M. A., Anderson, A. A., Choi, D-H., Brossard, D., Scheufele, D. A., Liang, X., Ladwig, P. J., Xenos, M., and Dudo, A. (2012) “Coverage of emerging technologies: A comparison between print and online media,” *New Media and Society* 14(6), 1039–1059.
- Carvalho, A. and Burgess, J. (2005) “Cultural circuits of climate change in UK broadsheet newspapers, 1985–2003,” *Risk Analysis* 25(6), 1457–1469.
- Chapman, D.A., Lickel, B. and Markowitz, E.M. (2017). *Reassessing emotion in climate change communication*. *Nature Climate Change*, 7(12), pp. 850.
- Chen, B.X. (2018). The internet trolls have won. Get used to it. *The New York Times*. 8 August, B7.
- Crow, D. and Boykoff, M. T. (Eds.) (2014). *Culture, Politics, and Climate Change: How Information Shapes Our Common Future*. New York: Routledge.

- Deane, C., Parker, K., & Gramlich, J. (2021). A year of US Public Opinion on the Coronavirus Pandemic. Pew Research Center.
<https://www.pewresearch.org/2021/03/05/a-year-of-u-s-public-opinion-on-the-coronavirus-pandemic/>
- Derrida, J. (1978) "Structure, sign, and play in the discourse of the human sciences," in J. Derrida (Ed.), *Writing and Difference*, Chicago, IL: University of Chicago Press, pp. 278–293.
- Dickinson, J. L., Crain, R., Yalowitz, S., and Cherry, T. M. (2013) "How framing climate change influences citizen scientists' intentions to do something about it," *The Journal of Environmental Education* 44(3), 145–158.
- Doyle, J. (2011). *Mediating Climate Change*. Surrey: Ashgate Publishing.
- Dunlap, R. E. (2008) "Climate-change views: Republican–Democrat gaps extend," *Gallup*, May 29.
- Dunlap, R. E. (2013) "Climate change skepticism and denial: An introduction," *American Behavioral Scientist*, DOI: 10.1177/0002764213477097.
- Fahy, D. and Nisbet, M. C. (2011) "The science journalist online: Shifting roles and emerging practices," *Journalism* 12(7), 778–793.
- Fisher, D. R. (2019). The broader importance of #FridaysForFuture. *Nature Climate Change*, 9(6), 430–431. <https://doi.org/10.1038/s41558-019-0484-y>
- Fitts, A. S. (2003) "Reuters global warming about face," *Columbia Journalism Review*, July 26. Retrieved August 6: www.cjr.org/the_observatory/reuterss_global_warming_about.php?page=2
- Fogerty, D. (2013) "Climate change," *The Baron*, July 15. Retrieved August 6: www.thebaron.info/blog/files/38aa654bc00bdf2bac925993875a7b67-694.php
- Forsyth, T. (2003) *Critical Political Ecology: The Politics of Environmental Science*, London: Routledge.
- Gavin, N.T. (2018). Media definitely do matter: Brexit, immigration, climate change and beyond. *The British Journal of Politics and International Relations*, pp. 1-19.
- Gieryn, T. F. (1999) *Cultural Boundaries of Science: Credibility on the Line*, Chicago, IL: University of Chicago Press.
- Goodman, M. K., & Jaworska, S. (2020). Mapping Digital Foodscapes : Digital Food Influencers and the Grammars of Good Food. *Geoforum*. 117: 183-193
- Goodman, M. K., Doyle, J., & Farrell, N. (2020). Practising everyday climate cultures: understanding the cultural politics of climate change. *Climatic Change*, 163(1).
<https://doi.org/10.1007/s10584-020-02863-7>
- Graham, M., Schroeder, R., and Taylor, G. (2013) "Re:search," *New Media and Society*, 12(3), 1–8.

- Greenberg, M. (2013) “Reuters climate change coverage declined significantly after ‘skeptic’ editor joined,” *Media Matters for America*, July 23. Retrieved August 14: <http://mediamatters.org/blog/2013/07/23/reuters-climate-change-coverage-declined-signif/195015>
- Greenhill, M., Leviston, Z., Leonard, R., and Walker, I. (2013) “Assessing climate change beliefs: Response effects of question wording and response alternatives,” *Public Understanding of Science* 22(3), 1–19.
- Hansen, A. and Machin, D. (2008). Visually branding the environment: climate change as a marketing opportunity. *Discourse Studies*, 10, pp. 777-794.
- Harlow, S. and Harp, D. (2013) “Collective action on the web,” *Information, Communication and Society*, 15(2), 196–216.
- Harvey, F. (2020). Atmospheric CO2 levels rise sharply despite Covid-19 lockdowns. The Guardian. <https://www.theguardian.com/environment/2020/jun/04/atmospheric-co2-levels-rise-sharply-despite-covid-19-lockdowns>
- Hestres, L. E. (2013) “Preaching to the choir: Internet-mediated advocacy, issue public mobilization, and climate change,” *New Media and Society* 1(1), 1–17.
- Hmielowski, J. D., Feldman, L., Myers, T. A., Leiserowitz, A., and Maibach, E. (2013) “An attack on science? Media use, trust in scientists and perceptions of global warming,” *Public Understanding of Science*, April 3, 1–18.
- Hoffman, A. J. (2011) “Talking past each other? Cultural framing of skeptical and convinced logics in the climate change debate,” *Organization and Environment*, 24(3), 3–33.
- Horan, T. J. (2013) “‘Soft’ versus ‘hard’ news on microblogging networks,” *Information, Communication and Society* 16(1): 43–60.
- Jacobson, S. (2012) “Transcoding the news: an investigation into multimedia journalism published on nytimes.com 200-2008,” *New Media and Society* 14(5): 867–885.
- Jankowski, N. W. (2006) “Creating community with media: History, theories and scientific investigations,” in L. A. Lievrouw and S. Livingstone (Eds.), *The Handbook of New Media*, Updated Student Edition, London/Thousand Oaks/New Delhi: Sage, pp. 55–74.
- Kahan, D.M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making*, 8(4), pp. 407-424.
- Krosnick, J. A., Holbrook, A. L., Lowe, L., and Visser, P. S. (2006) “The origins and consequences of democratic citizens’ policy agendas: A study of popular concern about global warming,” *Climatic Change* 77(1), 7–43.
- Leiserowitz, A. A. (2005) “American risk perceptions: Is climate change dangerous?” *Risk Analysis* 25, 1433–1442.
- Leiserowitz, A. A., Maibach, E., Roser-Renouf, C., Smith, N., and Dawson, E. (2013) “Climategate, public opinion and loss of trust,” *American Behavioral Scientist* doi:10.1177/0002764212458272.

- Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Carman, J., Wang, X., Goldberg, M., Lacroix, K., & Marlon, J. (2021). *Politics & Global Warming, December 2020*. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.
- Lewandowsky, S., Cook, J. Fay, N., & Gignac G. E. (2019). Science by social media: Attitudes towards climate change are mediated by perceived social consensus. *Memory & Cognition*, 47(1445-1456). <https://doi.org/10.3758/s13421-019-00948-y>
- Loosen, W. and Schmidt, J-H. (2012) “Re-discovering the audience,” *Information, Communication & Society* 15(6), 867–887.
- McCright, A. M. (2007) “Dealing with climate contrarians,” in S. C. Moser and L. Dilling (Eds.), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, Cambridge: Cambridge University Press, pp. 200–212.
- McCright, A. M. and Dunlap, R. E. (2003) “Defeating Kyoto: The conservative movement’s impact on US climate change policy,” *Social Problems* 50(3), 348–373.
- Murphy, P. D. (2021). Speaking for the youth , speaking for the planet: Greta Thunberg and the representational politics of eco-celebrity. *Popular Communication*, 1–14. <https://doi.org/10.1080/15405702.2021.1913493>
- Nielsen, R. K. (2012) “How newspapers began to blog,” *Information, Communication and Society* 15(6), 959–968.
- O’Neill, S. (2017). Engaging with Climate Change Imagery. *Oxford Research Encyclopedia of Climate Science*, 2, pp. 541-557.
- O’Neill, S. J. and Boykoff, M. T. (2010) “The role of new media in engaging the public with climate change,” in L. Whitmarsh, S. J. O’Neill, and I. Lorenzoni (Eds.), *Engaging the Public with Climate Change: Communication and Behaviour Change*, London: Earthscan,
- O’Neill, S. J., Boykoff, M. T., Day, S. A., and Niemeyer, S. (2013) “On the use of imagery for climate change engagement,” *Global Environmental Change* doi.org/10.1016/j.gloenvcha.2012.11.006.
- O’Sullivan, T., Dutton, B., and Rayne, P. (2003) *Studying the Media*, Bloomsbury, USA: Hodder Arnold.
- Olesen, T. (2020). Greta Thunberg’s iconicity: Performance and co-performance in the social media ecology. *New Media and Society*. <https://doi.org/10.1177/1461444820975416>
- Painter, J. (2013). *Climate Change in the Media: Reporting Risk and Uncertainty*. New York: I.B. Taurus & Co.
- Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., and Pidgeon, N. F. (2011) “Uncertain climate: An investigation into public scepticism about anthropogenic climate change,” *Global Environmental Change* 21(3), 1015–1024.
- Quart, A. (2010) “The trouble with experts,” *Columbia Journalism Review*, July/Aug, 17–18.
- Rogers, R. (2004) *Information politics on the Web*, Boston, MA: The MIT Press.

- Rosenberg, S., Vedlitz, A., Cowman, D. F., and Zahran, S. (2010) “Climate change: A profile of US climate scientists’ perspectives,” *Climate Change*, 101(1), 311–329.
- Ryzik, M. (2017). *Climate-Change Film? Is Emma Stone in It?* New York Times, 2 August, C1.
- Sabherwal, A., Ballew, M. T., van der Linden, S., Gustafson, A., Goldberg, M. H., Maibach, E. W., ... Leiserowitz, A. (2021). The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States. *Journal of Applied Social Psychology*, (July 2020), 1–13. <https://doi.org/10.1111/jasp.12737>
- Sarewitz, D. (2004) “How science makes environmental controversies worse,” *Environmental Science and Policy* 7: 385–403.
- Schäfer, M. S., & Painter, J. (2021). Climate journalism in a changing media ecosystem: Assessing the production of climate change-related news around the world. Wiley Interdisciplinary Reviews: *Climate Change*, 12(1), e675.
- Schmidt, G. and Wolfe, J. (2008) *Climate Change: Picturing the Science*, New York: W. W. Norton & Company.
- Schuurman, N. (2013) “Tweet me your talk: Geographical learning and knowledge production 2.0,” *Professional Geographer* 65(3), 369–377.
- Shank, M. (2017). *12 ways to improve climate change communications*. Huffington Post, 22 November. Available at: https://www.huffingtonpost.com/entry/12-ways-to-improve-climate-change-communications_us_5a15983fe4b0f401dfa7ec5f
- Shapiro, M.A.. & Park, H. W. (2018). Climate change and YouTube deliberation potential in post-video discussions. *Environmental Communication*, 12(1), 115-131. <https://doi.org/10.1080/17524032.2017.1289108>
- Shepherd, H., MacKendrick, N., & Mora, G. C. (2020). Pandemic Politics: Political Worldviews and COVID-19 Beliefs and Practices in an Unsettled Time. *Socius*, 6. <https://doi.org/10.1177/2378023120972575>
- Siegel, E. (2020). You Must Not ‘Do Your Own Research’ When It Comes To Science. Forbes. <https://www.forbes.com/sites/startswithabang/2020/07/30/you-must-not-do-your-own-research-when-it-comes-to-science/?sh=1678123c535e>
- Siles, I. and Boczkowski, P. J. (2012) “Making sense of the newspaper crisis: A critical assessment of existing research and an agenda for future work,” *New Media and Society* 14(8): 1375–1394.
- Starr, P. (2004) *The Creation of the Media: Political Origins of Modern Communications*, New York: Basic Books.
- Stecula, D. A., & Merkley, E. (2019). Framing Climate Change: Economics, Ideology, and Uncertainty in American News Media Content From 1988 to 2014. *Frontiers in Communication*, 4(February), 1–15. <https://doi.org/10.3389/fcomm.2019.00006>

- Sullivan, A., & White, D. D. (2020). Climate change as catastrophe or opportunity? Climate change framing and implications for water and climate governance in a drought-prone region. *Journal of Environmental Studies and Sciences*, 10(1), 1–11.
<https://doi.org/10.1007/s13412-019-00573-w>
- Sunstein, C. R. (2007) *Republic.com 2.0*, Princeton, NJ: Princeton University Press.
- Tabuchi, H. (2017). Spreading Lies on Climate Science, and Exploiting Google’s Algorithms to Do It. *The New York Times*. 29 December, B3.
- Tandoc Jr., E.C. and Eng, N. (2017). *Climate Change Communication on Facebook, Twitter and Sina Weibo*. Oxford Research Encyclopedia of Climate Science, 1, pp. 603-615.
- Tufekci, Z. (2013) “Not this one: Social movements, the attention economy, and microcelebrity networked activism,” *American Behavioral Scientist* 57(7), 848–870.
- Vainio, A. and Paloniemi, R. (2013) “Does belief matter in climate change action?” *Public Understanding of Science* 22(4), 382–395.
- van Dijk, J. (2006) *The Network Society*, London: Sage.
- Walter, S., Brüggemann, & Engesser, S. (2018). “Eco chambers of denial: Explaining user comments on climate change,” *Environmental Communication*, 12(2), 204–217.
<https://doi.org/10.1080/17524032.2017.1394893>
- Ward, B. (2008) *Communicating on Climate Change: An Essential Resource for Journalists, Scientists and Editors*, Providence, RI: Metcalf Institute for Marine and Environmental Reporting, University of Rhode Island Graduate School of Oceanography.
- Watts, J. (2019). The Greta Thunberg effect: at last, MPs focus on climate change. *The Guardian*. <https://www.theguardian.com/environment/2019/apr/23/greta-thunberg>
- Watts, J. (2020). CO2 in Earth’s atmosphere nearing levels of 15m years ago. *The Guardian*.
<https://www.theguardian.com/environment/2020/jul/09/co2-in-earths-atmosphere-nearing-levels-of-15m-years-ago>
- Whitmarsh, L. (2011) “Scepticism and uncertainty about climate change: Dimensions, determinants and change over time,” *Global Environmental Change*, 21(2), 690–700.
- Wilby, P. (2008) “In dangerous denial,” *The Guardian*, June 30, 9.
- Wynne, B. (2008) “Elephants in the rooms where publics encounter ‘science’?” *Public Understanding of Science* 17, 21–33.
- Yang, Z. J. and Kahlor, L. (2012) “What, me worry? The role of affect in information seeking and avoidance,” *Science Communication* 35(2), 189–212.
- Young, N. (2013) “Working the fringes: The role of letters to the editor in advancing non-standard media narratives about climate change,” *Public Understanding of Science* 22(4), 443–459.

Zhu, Y. and Dukes, A. (2013) “The selective reporting of factual content by commercial media,” University of Southern California working paper. Retrieved:
https://server1.tepper.cmu.edu/seminars/docs/FactualContent_2013-04-18.pdf