

IT'S TOO DARN HOT

How Rising Temperatures are Linked to Climate Change in the U.S. Print Media

A thesis submitted by

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in partial fulfillment of the requirements for the degree of

Master of Arts

in

Urban and Environmental Policy and Planning

Tufts University

May 2016

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Abstract

The print media has a profound impact on the public's opinion and knowledge of environmental issues, including climate change. This thesis explores how the media connects a key impact of climate change, rising temperatures, to climate change itself through a content analysis of newspaper articles about rising temperatures from the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post* from January 1, 1988 to December 31, 2015. This analysis finds that while a vast majority of articles about rising temperatures mentioned climate change and/or global warming, articles' discussions of these issues lacked depth, and fewer than half mentioned other impacts of climate change and other political, social, and economic issues. In one of the most striking findings of this study, it was discovered that few articles about rising temperatures discussed the social impacts of climate change, including social justice, political unrest, and impacts to vulnerable populations.

Acknowledgements

A sincere thank you to the following individuals who helped make my thesis process a rewarding and enjoyable one:

My advisor, **Ann Rapport**, for her invaluable guidance and thoughtful advice, consistent encouragement, abundant patience, and hours of time

My reader, **Julian Agyeman**, for his support and insightful feedback

My fiancée, **Matt Cahill**, for putting up with my stress and picking up my slack around the house

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Introduction

On March 6, 2015, Alan Rusbridger, then-editor of the UK-based *Guardian* newspaper, whose online edition is one of the most widely read in the world,¹ penned an op-ed published in the paper's Friday edition.² Poised to step down from his post in a few short months, Rusbridger contemplated regrets he might have once no longer at the helm of what he dubbed an "extraordinary agent of reporting, argument, investigation, questioning and advocacy."³ While he anticipated very few regrets, one did come to mind: "that we had not done justice to this huge, overshadowing, overwhelming issue of how climate change will probably, within the lifetime of our children, cause untold havoc and stress to our species."⁴ With this realization, Rusbridger introduced a crusade to quell his concerns. "In the time left to me as editor," he wrote, "I thought I would try to harness the *Guardian's* best resources to describe what is happening and what – if we do nothing – is almost certain to occur, a future that one distinguished scientist has termed as 'incompatible with any reasonable characterization of an organized, equitable and civilized global community.'"⁵

As Rusbridger astutely noted in his piece, climate change can be a difficult topic for journalists and news editors to cover.⁶ Changes to the climate, for example, while happening at near-lightning speed on a geologic timescale, are happening at a much slower speed than is often demanded by today's increasingly short news cycle or desired by today's readers with increasingly limited attention spans. Plus, the media tends to favor reporting on what has already happened, not speculating about future possibilities. As the worst impacts of climate change

almost certainly lie in the future, the issue is often at odds with the more retrospective stories journalists seek to tell.

Rusbridger's article helped bring important realities into the spotlight that are well-documented in the academic literature: climate change is one of the most serious issues facing our world today, and the media's coverage of climate change *matters*. The mass media functions as the key conveyor of information about complex problems such as climate change to the general public, which in turn influences the public's perception and understanding of these issues and the way policymakers respond to them.⁷ As the saliency of climate change as an important national issue remains relatively low and as the country remains without an overarching climate policy, the media can play an important role in elevating the exigency of the issue in the consciousness of the general public and on the national political agenda.

Rising temperatures are one of the most real and tangible ways Americans and others around the world are already experiencing the effects of climate change, and the media can play a unique role in helping to draw the connection between the trend of rising temperatures and the issue of climate change. While extensive past research has examined general coverage of climate change in the print media, little to no research has examined coverage of the impacts of climate change, including rising temperatures, and if and how the media connects these impacts back to climate change. This paper seeks to fill this gap and add an important new element to the discourse surrounding the media's coverage of climate change by exploring how climate change is reported in U.S. newspaper

articles about rising temperatures while also comparing how trends in the coverage of rising temperatures compare to general coverage of climate change in the print media.

To contextualize this topic, this paper begins with a brief introduction to climate change, including the key impacts of climate change and public opinion on the issue. An overview of climate change in the media, including trends and findings from previous research, is also presented, along with several media theories and frameworks that are frequently utilized in the literature to help make sense of climate change coverage. The specific research questions and methodology for this study are then introduced, followed by the key findings and conclusions revealed through this research.

This study ultimately found that climate change was frequently mentioned in articles about rising temperatures published in U.S. newspapers between 1988 and 2015, suggesting that the media does indeed tend to draw connections between rising temperatures and climate change. Discussions of climate change in these articles, however, tended to be relatively shallow and in many cases lacked depth and detail about other impacts of climate change and related political, social, and economic issues. Perhaps most notably, discussions of the social impacts and issues associated with climate change, such as social justice, impacts to vulnerable populations, and political unrest and instability, were essentially absent from articles included in this study. This study also revealed several similar trends in the print media's coverage of rising temperatures and general coverage of climate change. This included several similar noticeable spikes in the

volume of coverage over time as well as a tapering off of “balanced” coverage of the causes of climate change and simultaneous emergence of accounts that more accurately reflect scientific consensus over the anthropogenic nature of the issue.

Climate Change Overview

Climate change is arguably one of the most pressing issues facing our world today. As the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) reaffirmed, “recent climate changes have had widespread impacts on human and natural systems.”⁸ The origins of climate change can be traced to the Industrial Revolution, when increased amounts of carbon dioxide (CO₂) started being emitted into the atmosphere.⁹ Since then, CO₂ emissions have increased markedly, along with methane, nitrous oxide, and other greenhouse gases emitted through industrial, agricultural, and other human processes related to energy and land use.¹⁰ The concentration of greenhouse gases in the atmosphere is currently at an unprecedented high level never experienced before in the past 800,000 years.¹¹

There is widespread consensus within the scientific community that climate change is a result of human activity. In a 2004 study, Oreskes examined 928 abstracts published in “refereed” scientific journals and found that 75% of the papers either explicitly endorsed anthropogenic climate change, evaluated the impacts of climate change, or presented proposals for climate change mitigation.¹² None of the papers rejected anthropogenic climate change. In a survey of scientists by Farnsworth and Lichter, 97% of respondents concurred that average temperatures have risen over the past century, and 84% agreed that this warming was “human-induced.”¹³ The IPCC Fifth Assessment Report found that evidence of humans’ impact on the Earth’s climate system had grown since its previous report, stating that “it is extremely likely [(i.e. a 95-100% probability)] that more

than half of the observed increase in global average surface temperature from 1951-2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together.”¹⁴

Climate change is a multi-faceted problem with a multiplicity of adverse effects that are already being felt today both internationally and domestically. As the oft-used term “global warming” suggests, rising temperatures are one of the key impacts of climate change; according to the IPCC, “warming of the climate system is unequivocal,”¹⁵ and “each of the last three decades has been successively warmer at the Earth’s surface than any preceding decade since 1850.”¹⁶ The ten warmest years on record, globally, between 1880 and 2015 have all occurred since 1998, and 2015 was the hottest year on record, taking into account global combined land and ocean temperatures.¹⁷ In the United States, average temperatures have risen between 1.3°F and 1.9°F since 1895, with warming accelerating in the years since 1970.¹⁸ By the end of the century, temperatures in the U.S. could rise between 3°F and 5°F under a lower emissions scenario or up to between 5°F and 10°F under a higher emissions scenario.¹⁹

Rising atmospheric and ocean temperatures around the world have led to dwindling quantities of snow and ice as well as rising sea levels.²⁰ Globally, sea levels have risen about 8 inches over the past century.²¹ Climate change is also spurring more frequent extreme weather events, including heat waves, droughts, and storms²² and is already proving to be a drain on the U.S. economy. Since 1980, there have been 188 weather and climate disasters in the U.S. with losses of more than \$1 billion each, or over \$1 trillion combined.²³ 2011 saw the highest

number of billion dollar weather and climate disasters,²⁴ with 16 disaster events ranging from tornadoes and floods to Hurricane Irene.²⁵ Climate change is also projected to impact forests and ecosystems, along with agricultural, water, energy, and transportation systems.²⁶

Climate change is expected to take a human toll as well. Rising temperatures, for example, lead to more heat-related deaths and illnesses, while more frequent and extreme precipitation events and floods are likely to mean an uptick in waterborne illnesses.²⁷ A 2012 “Climate Vulnerability Monitor” report projected the worldwide death toll of climate change at a total of approximately 100 million lives between 2010 and 2030.²⁸ In many cases, it is those populations that are most marginalized and/or have access to the fewest resources that are most at risk, raising important social justice concerns. A 2014 IPCC report about climate change impacts, adaptation, and vulnerability noted the following as key areas of observed climate change impacts, vulnerability, and exposure:

- “Differences in vulnerability and exposure arise from non-climatic factors and from multidimensional inequalities often produced by uneven development processes (very high confidence). These differences shape differential risks from climate change. People who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses (medium evidence, high agreement).”²⁹
- “Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability (very high confidence).”³⁰
- “Climate-related hazards exacerbate other stressors, often with negative outcomes for livelihoods, especially for people living in poverty (high confidence).”³¹
- “Violent conflict increases vulnerability to climate change (medium evidence, high agreement). Large-scale violent conflict harms assets that

facilitate adaptation, including infrastructure, institutions, natural resources, social capital, and livelihood opportunities.”³²

Despite overwhelming consensus within the scientific community on the anthropogenic nature of climate change, the American public is more divided when it comes to the issue’s root cause. A 2016 Gallup poll found that while 65% of Americans believe that “increases in the Earth’s temperature over the last century are [due] to the effects of pollution from human activities,” representing a 10-percentage-point increase from 2015, over 30% of Americans still believe that “increases in the Earth’s temperature... are due more to...natural changes in the environment that are not due to human activities.”³³ The public’s perceived cause of global warming varies little by gender, with 50% of men and 49% of women indicating that they believe the Earth is getting warmer due to human activity.³⁴ It has also historically varied only slightly based on level of education.³⁵

Perception varies much more widely based on race, political association, and age. 44% of whites believe that global warming is caused by humans compared to 56% of blacks and a wide majority, 70%, of Hispanics.³⁶ 85% of Democrats but 68% of Independents and only 38% of Republicans believe that increases in the Earth’s temperature are primarily due to human activity.³⁷ Finally, polls indicate an inverse relationship between age and belief in the anthropogenic nature of climate change. While 60% of Americans age 18-29 believe that global warming is caused by humans, the same belief is held by 55% of Americans age 30-49, 48% of Americans age 50-64, and only 31% of Americans age 65+.³⁸

Despite differences in opinion over the root cause of climate change, Americans’ concern over global warming was at an eight-year high in 2016, with

64% of Americans expressing that they worry a great deal or a fair amount about global warming, up from 55% in 2015. 59% of Americans expressed that they believe the effects of global warming have already begun, also up from 55% in 2015.³⁹ Although these numbers appear to indicate that Americans are increasingly taking the issue of global warming more seriously, Americans' concern over climate change and global warming still, in many cases, lags behind the concern of those in other countries.⁴⁰

While Americans' general concern over global warming may be rising, the issues of climate change and global warming experience low saliency among the American public as important national political priorities when compared to other issues. When asked in a 2015 Gallup poll to rank the degree to which they worry about 15 different "national problems," Americans ranked climate change lowest on the list of issues they worry most about, with only 25% expressing that they personally worry about climate change a great deal.⁴¹ Climate change ranks as a low priority even when compared to other environmental issues. When asked to rank the degree to which they worry about different environmental problems in a 2015 Gallup poll, Americans indicated that climate change and global warming are the issues they worry about the least.⁴² Only 32% indicated that they worry "a great deal" about global warming or climate change, compared to 55% of Americans who worry a great deal about the pollution of drinking water. Again, responses varied widely by political party, with 52% of Democrats and only 13% of Republicans indicating that they personally worry a great deal about global warming.⁴³

Climate Change and the Media

A growing body of research indicates that the media plays a critical role in educating the public about climate change and influencing knowledge of and public opinion on the issue.⁴⁴ Mass media has been the primary way that the general public learns about political issues and scientific matters, and public perception and understanding of complex issues such as climate change has been found to be heavily dependent on and influenced by media coverage.⁴⁵ “Media representations... are 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 civil society rely upon media representations to help interpret and make sense of many complexities relating to climate science and governance.”⁴⁶ “Public perception in turn, affects how decision makers view and respond to risks, and while this link is complex and dynamic, media attention has been observed to open-up and direct discursive spaces for policy making in multiple contexts.”⁴⁷ In short, “research has found that mass media representations powerfully shape translations between climate science, policy and the public.”⁴⁸

Numerous studies have demonstrated a link between media coverage of climate change and public awareness and perception of the issue. In 2007, Nisbet and Myers examined questions from over 70 public opinion polls and surveys over a 20-year period to identify trends in public knowledge of global warming.⁴⁹ They found “strong connections between patterns in media attention to global warming and shifts in poll trends.”⁵⁰ After a period of sparse media coverage of

global warming in the early 1980s, only 39% of Americans indicated that they were familiar with the greenhouse effect when surveyed in 1986.⁵¹ However, in the wake of a hot North American summer in 1988 and subsequent swell of media coverage, the portion of the American public familiar with the greenhouse effect grew to 58%. Public awareness of global warming continued to grow in the following years and lingered around 80% for the next decade, peaking at 90% in 2006.

The type of media coverage individuals consume can have a profound impact on their opinions and beliefs.⁵² People who readily follow conservative media, for example, have a diminished sense of trust in scientists and belief in global warming, whereas those who follow “non-conservative” media have a higher sense of trust in scientists and stronger conviction over the reality of global warming.⁵³ Similarly, individuals who are more avid consumers of political news are more likely to see global warming as an unsettled debate and a less pressing issue with unclear consequences. Conversely, individuals who consume more scientific or environmental news have a greater likelihood of perceiving the scientific consensus surrounding global warming, its dire impacts, and the urgent need for action.⁵⁴

In recognition of the media’s powerful role in the communication of climate change, extensive past research has been conducted to broadly examine coverage of climate change, including key trends and themes, in the mass media, particularly in the print media. Studies of media coverage of climate change initially surfaced in the 1990s and have continued to emerge with greater

frequency since the mid-2000s.⁵⁵ This research has generally focused on coverage of climate change or global warming at a national level and can be classified into three primary categories: (1) Research examining climate change and global warming coverage in U.S. newspapers;⁵⁶ (2) Research examining climate change and global warming coverage in international newspapers;⁵⁷ and (3) Research comparatively examining climate change and global warming coverage in the newspapers of two or more countries.⁵⁸ Because this paper focuses on the U.S. print media, the background and overview of past trends and findings focuses primarily on research that falls into the first category.

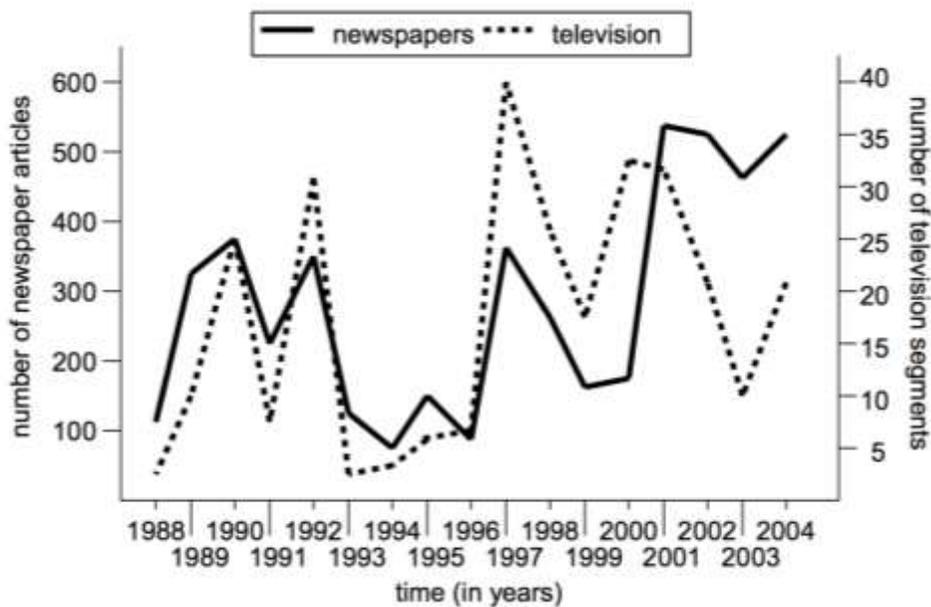


Figure 1. United States newspaper and television news coverage of climate change between 1988 and 2004.⁵⁹

Coverage of climate change in the U.S. mass media has changed and evolved over time.⁶⁰ A 2007 study of trends in global warming coverage by U.S. newspapers and television networks, for example, found noticeable spikes in coverage throughout the 1990s and into the 2000s (Figure 1).⁶¹ These swells in

coverage coincide in many cases with the release of important climate change research and with international climate conferences. An increase in coverage during 1990 can be attributed at least in part to the release of the IPCC's First Assessment Report in August and the subsequent release of the Scientists' Declaration at the World Climate Conference in November.⁶² Future spikes in coverage in 1992, 1997, and 2001 coincided with major international climate conferences – the Rio climate summit in 1992, the third annual meeting of the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) in Kyoto in 1997, and the climate talks in Bonn, Germany (COP6) held in 2001 in tandem with a G-8 summit in Genoa, Italy.⁶³ The IPCC Third Assessment Report was released the same year.⁶⁴ Heavy coverage spilled into 2002 following President George W. Bush's decision to not ratify the Kyoto Protocol, and it spiked again in 2004 when Russia ratified the treaty.⁶⁵

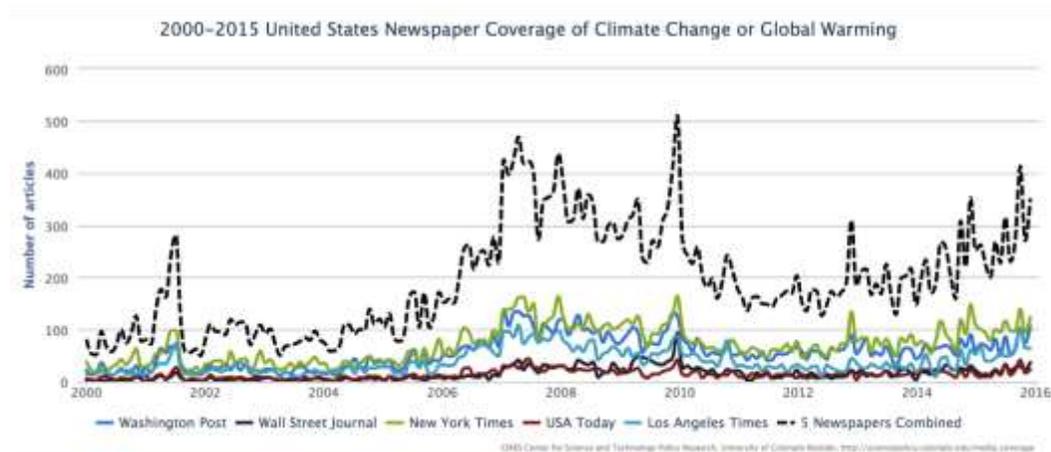


Figure 2. Coverage of climate change in U.S. newspapers between 2000 and November 2015.⁶⁶

The Center for Science and Technology Policy Research, part of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado, tracks newspaper coverage of climate change and global warming between 2000 and the present in 50 international newspapers through its Media and Climate Change Observatory (MeCCO), including five U.S. newspapers – the *Washington Post*, the *Wall Street Journal*, the *New York Times*, *USA Today*, and the *Los Angeles Times* (Figure 2).⁶⁷ Their research shows a peak in coverage of global warming and climate change in U.S. newspapers in July 2001,⁶⁸ during the COP6 climate summit in Bonn, Germany,⁶⁹ and an overall swell of coverage between January 2007 and December 2010.⁷⁰ Heavy coverage in early 2007 coincides with the release of the IPCC Fourth Assessment Report,⁷¹ and a peak in December 2007 aligns with the COP13 climate summit in Bali.⁷² Global warming and climate change coverage in U.S. papers reached an all-time high in December 2009,⁷³ the month of the COP15 summit in Copenhagen.⁷⁴ Coverage fell precipitously in the months following before building again with smaller peaks in November 2012 and November 2014,⁷⁵ ahead of the COP18 and COP20 climate talks in Doha and Lima, respectively.⁷⁶ It climbed again in September 2015⁷⁷ as Pope Francis spoke to the United Nations General Assembly about the urgent need for action on environmental issues and climate change⁷⁸ and world leaders prepared for the highly anticipated COP21 climate summit in Paris in December.⁷⁹

To date, the content of news coverage on climate change has largely centered on the issue at large and “been primarily focused on the science of

climate change, impacts, and mitigation.”⁸⁰ Several unique articles, however, have examined more specific facets of the issue or particular climate change impacts. In 2013, for example, Weathers examined the coverage of climate change as a public health issue in five U.S. newspapers between 2007 and 2008 and found that the public health frame for climate change is relatively underutilized by the print media.⁸¹ A 2015 study by Ford and King examined newspaper articles from four American and Canadian newspapers between 1993 and 2013 about adaptation and discovered that although climate change adaptation crops up in the print media, it remains largely overshadowed by discussions of climate change mitigation.⁸²

While little past research has specifically studied coverage of rising global temperatures, a 2000 study by Shanahan and Good explored connections between local temperatures in New York City and Washington D.C. and the volume of newspaper articles on climate change.⁸³ The authors hypothesized that variations in local temperatures would be predictors of media attention to climate change and that “hotter periods [would be] more likely to be associated with more frequent and heavier attention to the issue of global climate change.”⁸⁴ Based on their analysis, however, Shanahan and Good concluded that while there were some residual relationships between local temperatures and attention to climate change in the media, other factors such as scientific research and political events were more important determinants of climate change coverage than local temperatures.

Media Theories and Frameworks

Media theories, models, and frameworks are often utilized in academic literature to help contextualize and make sense of climate change coverage in the mass media. While these theories and frameworks range in their applicability and utility, several of the most relevant and frequently cited theories are outlined below, along with descriptions of their central tenets and how they have been applied in studies of environmental and climate change communications.

Journalistic Norms

While historically largely partisan, the U.S. mass media has evolved over time “into a large-scale commercialized news apparatus, and, after engaging in the process of professionalism, have grafted on traditions of objectivity and adversarial neutrality.”⁸⁵ As news outlets have professionalized in recent decades, a set of journalistic norms has developed that reflects standards of approval and acceptability for journalism and the behavior of journalists. These “complex sets of behavioral norms... guide appropriate journalistic work [and] allow journalists to function within [a] multidimensional space... by helping them to meet at least three goals: maximizing service to readers; constructing stories efficiently; and minimizing the effects of attacks on the occupation from outside groups.”⁸⁶ According to Bennett, three key normative orders underlie the journalistic process and influence journalists’ decision-making: professional norms, political norms, and economic norms.⁸⁷ Professional norms are “norms about the journalism profession,”⁸⁸ political norms are “norms about the proper role of the press in

politics,”⁸⁹ and economic norms are “the normative constraints of the business side of news organizations” and include considerations such as efficient reporting and profitability.⁹⁰

The professional journalistic norm of “balance” underlies the journalistic principle of objectivity along with elements such as accuracy, comprehensiveness, fairness, and loyalty.⁹¹ In an attempt to remain neutral, present “balanced” reporting, and adhere to “the professional obligation to provide authoritative information,”⁹² it is common for journalists to present all of the conflicting viewpoints of an issue with approximately equal attention given to each side.⁹³ In an environment in which many reporters are time-crunched and lack expertise on the technical or scientific topics they cover, it can be difficult for journalists to independently verify all claims and viewpoints related to their subject matter. Balance, therefore, also often becomes “a surrogate for validity checks.”⁹⁴ While the intention behind balanced reporting is understandable and indeed appropriate in cases, it “does not, of course, always mean accurate coverage,”⁹⁵ particularly on issues of settled science, such as climate change.

As eloquently articulated by author Ross Gelbspan:

The professional canon of journalistic fairness requires reporters who write about a controversy to present competing points of view. When the issue is of a political or social nature, fairness – presenting the most compelling arguments of both sides with equal weight – is a fundamental check on biased reporting. But this canon causes problems when it is applied to issues of settled science. It seems to demand that journalists present competing points of view on a scientific question as though they had equal scientific weight, when actually they do not. The problem escalates because most journalists are not qualified to make judgments about issues such as standing, expertise, and ideology within the scientific community. As a result, ideology disguised as science can contaminate the debate.⁹⁶

Although the scientific community is in overwhelming agreement over the reality of climate change and its anthropogenic nature, the general American public remains divided on the issue, as previously described. Given this disconnect, a number of studies have examined the level of balance in news coverage of global warming and climate change by the mass media. In many cases, these studies have assessed the extent to which news sources report on the scientific consensus surrounding climate change or portray the issue as an unsettled debate.

In one of the first studies of balanced reporting on global warming in the U.S. print media, Boykoff and Boykoff examined coverage of the issue between 1988 and 2002 in the “prestige press,” comprised of the *New York Times*, the *Washington Post*, the *Los Angeles Times*, and the *Wall Street Journal*.⁹⁷ They discovered that balanced coverage was present in the majority of prestige press articles about global warming, with 52.65% of articles devoting essentially equal attention to the viewpoint of the anthropogenic nature of global warming and to the conflicting belief that present-day global warming is part of a larger natural cycle of periodic temperature fluctuations.⁹⁸ An additional 35.29% of articles also presented both viewpoints but emphasized human contributions to the problem.⁹⁹ Only 5.88% of articles exclusively focused on the anthropogenic nature of global warming, while a slightly higher percentage, 6.18%, primarily expressed doubt over human contributions to global warming.¹⁰⁰

When broken down by year, Boykoff and Boykoff also found that coverage of global warming has changed and morphed over time. When global

warming initially rose to national prominence in 1988 and 1989, news coverage centered primarily on the anthropogenic nature of the issue. From the 1990s on, however, coverage shifted decidedly toward balanced accounts, as the issue became increasingly politicized and a small but vocal group of climate skeptics emerged.

In addition to examining overall coverage of the issue, Boykoff and Boykoff explored coverage of proposed action on global warming. They similarly discovered that 78.2% of articles presented balanced approaches to global warming action that highlighted both the need for immediate, mandatory action and the need for cautious, voluntary action.¹⁰¹ Calls for immediate and mandatory action dominated in only 10.63% of articles, while cautious and voluntary action was dominant in 11.17% of articles.¹⁰² Based on these findings, Boykoff and Boykoff ultimately concluded that “adherence to the norm of balanced reporting leads to informationally biased coverage of global warming.”¹⁰³ “Despite the highly regarded IPCC’s consistent assertions that global warming is a serious problem with a ‘discernable’ human component that must be addressed immediately, balanced reporting has allowed a small group of global warming skeptics to have their views amplified.”¹⁰⁴

While balanced reporting on climate change has historically dominated coverage in the U.S. print media, subsequent studies have, encouragingly, shown a decrease in balanced reporting in more recent years in favor of more accurate coverage. Maxwell Boykoff conducted a follow-up study examining climate change articles from the *Los Angeles Times*, the *New York Times*, *USA Today*, the

Wall Street Journal, and the *Washington Post* between 2003 and 2006.¹⁰⁵ His analysis revealed that the number of articles offering balanced accounts of climate change fell from nearly 33% of articles in 2003 to just slightly above 3% in 2006. Despite statistically significant differences in articles focusing on anthropogenic climate change and those presenting balanced accounts between 2003 and 2004, there existed no significant difference in coverage between 2005 and 2006.

This shift in news reporting in the mid 2000s from primarily balanced coverage of climate change to coverage that more accurately reflected scientific consensus on the issue's anthropogenic nature can be attributed to three primary influences – political, scientific, and ecological/meteorological.¹⁰⁶ On the international political stage, Prime Minister Tony Blair voiced strong support for action on climate change and adoption of climate policies ahead of the 2005 G8 summit hosted in the U.K., while even the more tepid George W. Bush acknowledged the existence of climate change and humans' contribution to it.¹⁰⁷ Domestically, concrete actions and policies began to accelerate, as California Governor Arnold Schwarzenegger signed a heavily publicized executive order to slash the state's greenhouse gas emissions by 80% by 2050.

Scientific evidence of climate change and the need for action also continued to mount.¹⁰⁸ A statement was issued in 2005, for example, by the scientific bodies of eleven nations including Brazil, China, and India that helped inch progress toward agreement between the Global North and South on responsibility for global greenhouse emissions and emission reductions.¹⁰⁹ Finally, Hurricane Katrina, which made landfall in August of the same year,

raised the issue of climate change in the consciousness of the American public and helped make clear the connections between extreme weather events, climate change, and human activity.¹¹⁰

Agenda-Setting

As described, the mass media, including the print media, can have an impactful role in raising issues in the public consciousness and on the public agenda. Agenda-setting theory, which is frequently invoked in literature about news coverage of climate change, describes the phenomena by which “salient issues are transferred from the media agenda to the public agenda, and agenda setting is to be seen as the news media’s creation of public awareness of an issue. Thus, the more the news media report about particular issues, the more prominence these issues will gain among the general public.”¹¹¹

Agenda-setting theory is predicated on a series of what have been identified by Pralle as four basic assumptions.¹¹² First, there are three basic types of agendas that exist within a democratic society: (1) the public agenda, made up of the issues most important to general citizens and the electorate, (2) the government agenda, comprised of the issues under consideration and debate by governing bodies such as the legislature, and (3) the decision agenda, encompassing a more narrow set of issues on which decision-makers are prepared to imminently act.¹¹³ Outside of the governmental sphere, non-governmental organizations, businesses, and institutions, including the media, can have their own agendas as well, which can have a profound impact on governmental and

public agendas.¹¹⁴ The climate crusade launched by the U.K.'s *Guardian* newspaper described in the introduction to this study is an excellent example of agenda-setting by the media.

The second assumption of agenda-setting theory is that each of these agendas, including the public agenda, has a “carrying capacity,” meaning that only a finite number of issues can be on the agenda at any one time.¹¹⁵ Issues, therefore, are in constant competition for a place on the public agenda. According to Pralle’s third assumption, however, it is less beneficial to consider issues as either on or off the agenda. Rather, issues can be thought of as existing on an agenda continuum, on which some issues are highly important and feature prominently, while others are seen as less relevant or urgent and therefore feature less prominently.¹¹⁶ And fourth, the agenda-setting theory operates under the assumption that issues of high saliency have a greater likelihood of moving onto the government’s decision agenda and being primed for action.¹¹⁷

Agenda-setting theory first emerged in the 1970s.¹¹⁸ Initial agenda-setting research and application focused largely around the influence of the media’s coverage of particular issues on raising the public’s attentiveness to and interest in those issues.¹¹⁹ In one of the earliest and now frequently cited pieces of agenda-setting literature,¹²⁰ McCombs and Shaw studied the 1968 U.S. presidential campaign and found that the mass media played a central role in determining the important issues during the campaign, in many ways setting the campaign agenda.¹²¹ The theory has since been readily applied to a number of environmental problems and issues, ranging from specific events, such as the

1992 United Nations Conference on Environment and Development (UNCED), to broader issues such as global warming.¹²²

Much of the public relies on the mass media for information and cues as to the saliency of environmental issues. To explore the mass media's agenda-setting function of environmental issues, Atwater, Salwen, and Anderson examined coverage of environmental issues in three Lansing, Michigan area daily newspapers for a period of two months in 1983.¹²³ They found extensive coverage of environmental issues in the newspapers, which fell into six major categories: (1) disposal of wastes, (2) quality of water, (3) hazardous substances, (4) quality of land, (5) quality of air, and (6) wildlife conservation.¹²⁴ When surveyed, 99% of local residents indicated that they read at least one of the newspapers reviewed, and 83% indicated that they got most of their information about environmental issues from the newspaper.¹²⁵

Residents were also asked to indicate how important they felt the six major environmental issues covered were to them personally and how important they felt these same issues were to the news media. Upon analysis of the responses, the researchers found a moderate relationship between the personal salience of environmental issues to residents and their perceived salience of environmental issues to the news media.¹²⁶ “This finding suggests that the mass media may be able to transfer detailed levels of information about a single issue to the audience.”¹²⁷

Issue-Attention Cycle

As the agenda-setting theory describes, issues tend to move up and down on the public agenda over time, and the issue-attention cycle seeks to describe the movement of issues and problems in and out of the public consciousness and shifts in the focus of the American public from issue to issue over time.¹²⁸ The issue-attention cycle model was developed by Anthony Downs in his seminal work “Up and Down with Ecology – the ‘Issue-Attention Cycle’.” “A systemic ‘issue-attention’ cycle,” he argues, “seems strongly to influence public attitudes and behavior concerning most key domestic problems.”¹²⁹ Of a plethora of national issues, “each of these problems suddenly leaps into prominence, remains there for a short time, and then – though still largely unresolved – gradually fades from the center of public attention.”¹³⁰

According to Downs, the issue-attention cycle is comprised of five stages that may vary in length but tend to occur in a standard order:

- (1) **The pre-problem stage:** In the pre-problem stage, an issue, problem, or negative social condition exists, but although it may be recognized by a group of concerned experts or a specialized interest group, it has yet to capture the attention of the public at large.¹³¹
- (2) **Alarmed discovery and euphoric enthusiasm:** In the cycle’s second stage, the undesirable issue or problem captures the attention of the public through, for example, an intense or alarming event or series of events.¹³² Accompanying the public’s newfound knowledge and sense of alarm over the issue is generally a sense of “euphoric enthusiasm”

over the potential of society to address or solve the issue.

- (3) **Realizing the cost of significant progress:** As realization of the problem sinks in, initial optimism over society's ability to address it within a relatively short timeframe is replaced by a growing understanding of the high cost in time, money, and resources necessary to truly solve the problem.¹³³
- (4) **Gradual decline of intense public interest:** Three reactions tend to dominate public perception as the difficulty and costliness of addressing the problem sets in.¹³⁴ Some individuals get discouraged and disheartened, some feel "positively threatened" by merely thinking about the problem and stifle their thoughts, and some simply lose interest in the issue. Many people experience a mix of these reactions. As a consequence exacerbated by competition from other issues entering the second phase of the cycle and siphoning away attention from the issue at hand, the public's interest in the initial problem starts to fade.
- (5) **The post-problem stage:** With the original issue replaced in the public's mind by a subsequent problem that has started to advance through the issue-attention cycle, it enters a period of "prolonged limbo," "a twilight realm of lesser attention or spasmodic recurrences of interest."¹³⁵ In this final phase, however, the issue functions differently than in the initial pre-problem phase. As significant attention was focused on the issue in the earlier phases of the cycle,

new programs, policies, institutions, and organizations were likely to have emerged around the issue. This infrastructure tends to persist even after the issue has entered the post-problem phase and public attention has dwindled. Additionally, even after entering the cycle's final phase, major issues may see periodic resurgences in public interest over time, or particularly compelling components of the issue may become hitched to other problems receiving high levels of public attention. Ultimately, issues that have cycled through these five phases tend to enjoy "a higher average level of attention, public effort, and general concern" than issues that remain undiscovered in the pre-problem phase.¹³⁶

Every issue or major societal problem does not enter and progress through the issue-attention cycle.¹³⁷ Issues that tend to move through the entire cycle, capturing public attention and taking center stage before fading from the public's mind and being replaced by other issues, frequently share three key characteristics. First, the problem impacts a minority (i.e. small percentage) of individuals in society but not the majority of society to as significant an extent.¹³⁸ Without consistently feeling the effects of the problem, the issue is less likely to persistently stay at the forefront of most people's minds. Second, the adverse effects caused by the problem are the result of social structures or arrangements that benefit a majority of society or a small but powerful minority.¹³⁹ Addressing the problem will therefore require significant institutional or behavioral changes that threaten the status quo and potentially powerful interests. Finally, the issue

lacks drama and excitement.¹⁴⁰ “A problem must be dramatic and exciting to maintain public interest because news is ‘consumed’ by much of the American public (and by publics everywhere) largely as a form of entertainment.”¹⁴¹ When an issue has no innately exciting or dramatic qualities, ongoing media coverage of it is likely to bore the public and spur a shift in their attention to more novel issues or compelling problems.

A relatively elegant and straightforward model, the issue-attention cycle is frequently invoked in discussions of media coverage of climate change.¹⁴² The literature, however, also frequently points out the model’s limitations, and findings over the effectiveness of the issue-attention cycle at explaining climate change in the media have varied. In a study of global warming coverage in the *New York Times* and the *Washington Post* between 1980 and 1995, for example, McComas and Shanahan criticize Downs’ issue-attention cycle as failing to account for and recognize the important “role played by narratives in driving media attention to environmental issues.”¹⁴³ They argue, however, that “the media’s master story resembles Downs’s issue-attention cycle: The story begins with a crescendo of dramatic claims that attracts attention to the issue, peaks with efforts to solve the problem, and then advances to a denouement and resolution of the story.”¹⁴⁴

In light of the numerous rises and falls in global warming coverage in the mass media seen over time during their study period of 1988 to 2004, Boykoff and Boykoff, on the other hand, contend that the issue-attention cycle is ineffective at explaining the issue.¹⁴⁵ They argue:

The Downs model is inadequate primarily because it does not pay enough attention to the crucial role played by the mass media, and more specifically to the journalistic norms that undergird news production. Although the model argues that ecological issues will naturally follow an up-and-down path because of qualities inherent to the issues themselves, this is clearly not the case, as global warming has gradually become a more serious threat over time. The persistence of environmental problems on the social docket is affected more by the way these problems are constructed in the newspaper and television news media than by a natural history framework, and the way problems are constructed in the media is rooted in the use of mass-media norms.¹⁴⁶

Framing

According to Ford and King, framing “can be defined as the process by which broad organizing themes are selected and emphasized, elements of a story such as the scenes, their characters and actors are emphasized, and supporting documentation used.”¹⁴⁷ Framing in the media and pieces such as newspaper articles “thus communicates how and why an issue should be seen as a problem, how it should be handled, and who is responsible for it, and is an inherent part of human cognition for organizing and contextualizing events.”¹⁴⁸ The way that an issue is covered or “framed” by the media, through intentional or unintentional decisions regarding components such as language, tone, and treatment and placement of relevant information and important facts, can profoundly impact how members of the general public, as well as policymakers, understand and interact with that issue.¹⁴⁹ Understanding this influence, numerous scholars have studied the various frames employed by the media when covering climate change.

To explore the historic proclivity toward balanced reporting of climate change by the U.S. print media described above, Maxwell Boykoff studied the key frames used in U.S. television segments and newspaper articles about climate

change between 1995 and 2006.¹⁵⁰ Consistent with Boykoff and Boykoff's earlier findings,¹⁵¹ he discovered that the frame of conflict, contention, and confusion was pervasive in climate change coverage by the U.S. mass media and resulted in a narrative of growing debate and uncertainty of climate change over time.¹⁵² The frame of "coherence regarding scientific explanations of anthropogenic climate change" has been less dominant.¹⁵³ A series of semi-structured interviews with journalists and scientists revealed that the prominence of the contention frame is likely the result of the emergence of a cadre of climate change deniers whose harnessing of the media to espouse doubts over anthropogenic climate change with subsequently ineffective rebuttals from the scientific community has diffused and driven their viewpoint into and across the mainstream media over time.¹⁵⁴ The interviewees also suggested that the recurrence of the frame of contention is also likely a result of the "challenges in dealing with uncertainty in translations between science and policy as well as the public via mass media."¹⁵⁵

In a similar study to Boykoff's, Shehata and Hopmann explored climate change framing in U.S. and Swedish newspapers between the Kyoto climate change summit in December 1997 and the Bali climate change summit in December 2007 but with different results.¹⁵⁶ In both U.S. and Swedish newspapers, they found widespread application of the climate change frame; this frame, which "posits that global warming is a significant social problem caused by human activity through the emission of carbon dioxide and other so-called greenhouse gases into the atmosphere,"¹⁵⁷ was present in between 50-79% of paragraphs in the newspaper stories reviewed.¹⁵⁸ The scientific uncertainty frame,

similar to what Boykoff describes as the contention frame, “claims that the scientific community is divided regarding global warming, that existing research is inconclusive when it comes to the causes and consequences of global warming, and that natural variation is the driving force behind increasing global temperatures.”¹⁵⁹ Departing drastically from previous studies, Shehata and Hopmann found very little evidence of the scientific uncertainty frame in their research, and it was completely absent from their intensive case studies of coverage during the Kyoto and Bali climate summits.¹⁶⁰ The researchers explain this divergence from past findings as due in part to the inherent differences between routine climate change coverage and coverage of the issue during climate summits.¹⁶¹

Shehata and Hopmann also found evidence of the economic consequences frame in coverage of the Kyoto summit but essentially no inclusion of the frame during the Bali summit;¹⁶² the economic consequences frame “has been used primarily as an argument against binding legislation. Caps on emissions would substantially harm the national economy and lead to higher levels of unemployment. More recently, however, environmentalists and politicians who favor actions to combat global warming have also used an economic opportunity frame that recasts climate change as an opportunity to boost the economy.”¹⁶³

As the literature reveals, the terms global warming and climate change are frequently used, sometimes synonymously, in discussions of the consequences and impacts resulting from the increasing concentration of greenhouse gases in the atmosphere. Schuldt and Roh conducted a web-based study to explore the

impact of framing the issue as either “global warming” or “climate change” on political partisans’ view and cognitive associations of the issue.¹⁶⁴ They found variations in participants’ responses and cognitive associations between the frames.

Participants’ understanding of “impact associations,” which included the impacts of climate change such as rising temperatures, varied in several cases by political association. Conservatives were more likely, for example, to associate the term global warming with heat-related impacts such as rising temperatures and melting ice than the term climate change, while liberals were equally as likely to associate heat-related impacts with both frames. Echoing the large partisan divide on the issue visible in public opinion polls, participants’ political affiliation was a significant predictor of “impact association,” where conservatism was a negative predictor of participants’ association of rising temperature, melting polar ice, pollution, immediate impacts, and delayed impacts and was a positive predictor of natural variation. The results of Schuldt and Roh’s study emphasize the significant impact of framing on the public’s response to and understanding of important issues like climate change and “extend the growing literature in environmental communications on the effects of various labels or frames for global climate change on public perceptions.”¹⁶⁵

Methodology

An extensive body of past research has examined general coverage of global warming and climate change in the print media, but very little existing research has examined if, how, and to what extent the media connects the well-documented impacts of climate change, such as rising temperatures, to the issue of climate change itself. In an effort to help fill this void and further elucidate how climate change is covered by the media, this study incorporates a detailed content analysis of U.S. newspaper articles to examine how climate change is discussed in articles about rising temperatures. More specifically, this study sought to answer the following overarching question and sub-questions:

- How is climate change reported in U.S. newspapers within the context of articles about rising temperatures?
 - Does coverage draw connections between rising temperatures and climate change?
 - What factors seem to influence articles' inclusion or lack of inclusion of climate change?
 - How does reporting on climate change in articles about rising temperatures vary over time?
 - Do articles that mention climate change reflect “balanced” reporting of the issue (e.g. both the anthropogenic nature of the problem *and* the influence of natural variability) or accurately reflect scientific consensus over the anthropogenic nature of the issue?

- What, if any, other climate change topics or impacts are discussed in articles about rising temperatures (e.g. climate policies, climate conferences, economic impacts, social justice impacts), and how are they reported?

With a large volume of past research examining general trends in climate change coverage in the U.S. print media over time, this study also sought to examine how trends in coverage of climate change within articles about rising temperatures compare to general coverage of climate change.

The data for this study were drawn from newspaper articles published in four prominent U.S. newspapers: the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post*. These newspapers were selected based on both current circulation as well as their inclusion in similar previous studies. The *New York Times*, *USA Today*, and the *Wall Street Journal* were reported to have the highest national circulations based on the most recently available data at the time this study was developed in Fall 2015.¹⁶⁶ All four newspapers have also been frequently studied in past literature examining climate change coverage in the print media based on their circulation, prestige, and influence.¹⁶⁷ It is relevant to note that several other studies have also examined coverage in the *Los Angeles Times*. The *Los Angeles Times*, however, was excluded from this study due to its lack of online availability in databases accessible through the Tufts University library.

In order to understand trends and changes in coverage over time, newspaper articles from January 1, 1988 through December 31, 2015 were

included in this sample. This timeframe was selected based on the methodology of Boykoff and Boykoff, two of the most prolific scholars of climate change in the media, who have utilized 1988 as the starting point for numerous studies based on several key events that took place that year: (1) James Hansen testified to Congress about climate change and the urgent need for action; (2) Margaret Thatcher spoke publically about the threat of climate change; (3) a major North American heat wave sensitized the American public to the issue of global warming; (4) the Intergovernmental Panel on Climate Change (IPCC) was created; and (5) the World Meteorological Organization (WMO) held an international conference, “Our Changing Atmosphere,” in Toronto.¹⁶⁸ Also consistent with the methodology of past literature, December 31, 2015 was chosen as the end date for this study because it allowed for the inclusion of all articles during the last full calendar year that had elapsed at the time of this study.¹⁶⁹

The sample for this study was compiled through searches conducted in LexisNexis of the *New York Times* and the *Washington Post* and in Factiva of *USA Today* and the *Wall Street Journal*. In order to cast a wide net and ensure a comprehensive and robust sample, the following search query was utilized for each newspaper: “global annual temperature” or “global average annual temperature” or “warmest year” or “hottest year” or “global average surface temperature” or “global average temperature” or “global temperature” or “annual mean temperature” or “annual heat record” or “year’s average temperature” or “world temperature.” This query yielded 2,239 results – 894 articles from the *New*

York Times, 111 articles from *USA Today*, 144 articles from the *Wall Street Journal*, and 1,090 articles from the *Washington Post*.

A series of subsequent steps were taken to refine the sample and ensure that it included only news stories for which rising temperatures were the primary focus. Based on the methodology of past literature, opinion editorials, letters to the editor, book reviews, and editorials were omitted from the sample.¹⁷⁰ To maintain a focus on stories appearing in print publications, blog and web articles were also excluded, leaving 1,216 articles – 555 articles from the *New York Times*, 107 articles from *USA Today*, 100 articles from the *Wall Street Journal*, and 454 articles from the *Washington Post*.

The headlines and content of all articles were then skimmed to generate the final sample, and only articles that were primarily focused on rising temperatures were maintained. The final sample was comprised of articles that highlighted monthly, seasonal, annual, or multiyear temperature trends on a local (city or district), state, regional (multistate), national (United States), or global scale. Because this study was intended to focus on articles discussing temperature *trends*, articles highlighting single-day or several-day temperature records were omitted. To further refine the sample and ensure that the articles included were similar enough in their focus to be effectively compared, articles discussing century or multi-century trends were also omitted. The final sample consisted of 105 articles, comprised of 35 articles from the *New York Times*, 26 articles from *USA Today*, 9 articles from the *Wall Street Journal*, and 35 articles from the *Washington Post*. Many of the articles that comprised the final sample were

focused on record-setting high temperatures (e.g. 2015 was the hottest year on record). For a full list of articles included in the sample, please refer to *Appendix A*.

In order to perform the content analysis, the full content of all articles, including the article headline and body, were then read and studied in detail. Several keyword searches were also conducted in Microsoft Word using the “find” feature to supplement this review. Additional specific methodology, including discussion of specific coding and key word searches conducted, is presented in conjunction with the study results in the following “Results” section. All results and findings for this study were tracked in Microsoft Excel, which was also used for the generation of descriptive statistics and figures, where applicable.

Results

The sample for this study consisted of 105 articles about rising temperatures published in four prominent U.S. newspapers. 33% of the articles appeared in the *New York Times*, 33% appeared in the *Washington Post*, and 25% appeared in *USA Today*. The remaining 9% appeared in the *Wall Street Journal* (Figure 3).

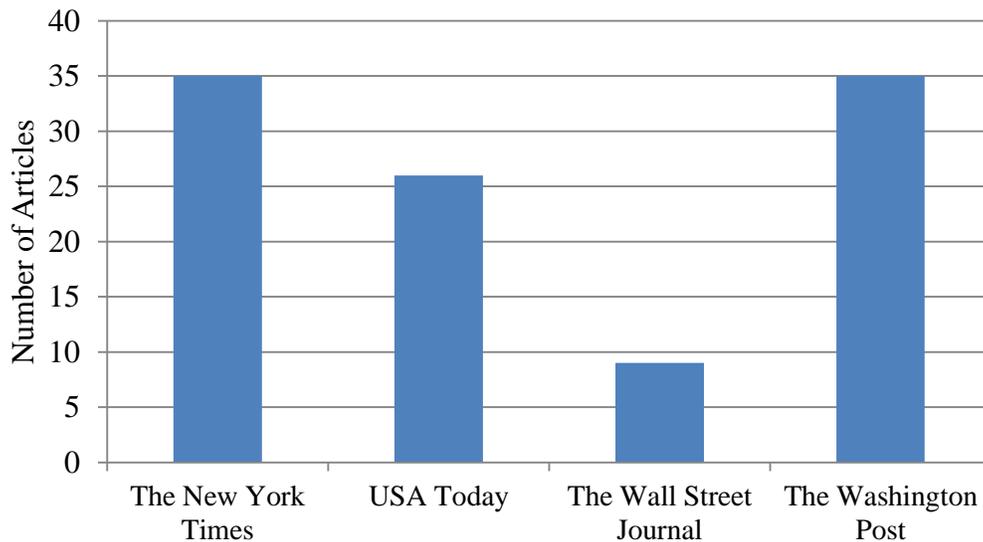


Figure 3. Number of articles in sample focusing on rising temperatures, by newspaper.

To trace coverage of rising temperatures and discussions of climate change over time, this study included articles that appeared in the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post* between January 1, 1988 and December 31, 2015. As Figure 4 depicts, the number of articles focused on rising temperatures has varied over time, with major peaks in coverage in 1991, 1998, 2007, and 2012.

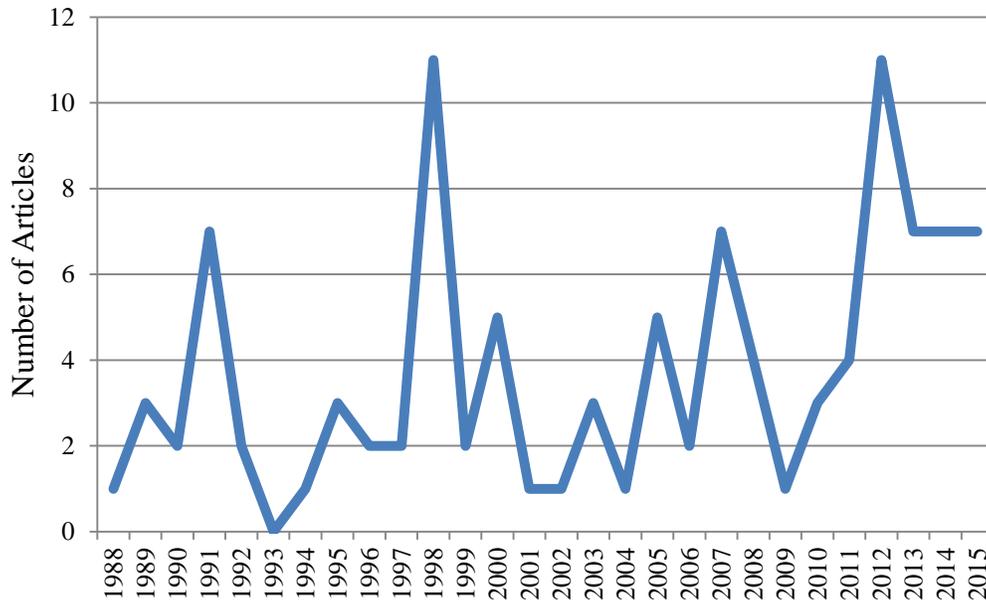


Figure 4. Number of articles in sample focused on rising temperatures and temperature trends by year published.

Information about the newspaper sections in which articles included in this sample were published is presented in Tables 1-4. It is important to note, however, that this information was provided inconsistently between the databases and newspapers searched, with some articles including no information about the section in which they were published. These instances are denoted as “Not provided” in the tables below.

In a departure from previous studies, in an effort to ensure a sizable sample, this study included articles from newspapers’ less news-related sections, such as the “Style” section. As the results in Tables 1-4 show, however, most articles about rising temperatures across all four newspapers fell within papers’ first sections.

Newspaper Section	Number of Articles
Section A	28
Section C	2
Section 4	2
Section 14NJ	2
Not provided	1

Table 1. Newspaper section of articles in sample published in the *New York Times*. For consistency, articles that were labeled as being published in “Section 1,” which appeared between 1989 and 1991, were recorded in this table as appearing in “Section A.”

Newspaper Section	Number of Articles
A	23
B	1
Not provided	2

Table 2. Newspaper section of articles in sample published in *USA Today*.

Newspaper Section	Number of Articles
A	7
B	1
Not provided	1

Table 3. Newspaper section of articles in sample published in the *Wall Street Journal*.

Newspaper Section	Number of Articles
A Section	23
District Weekly	1
Foreign	1
Kidspost	2
Metro	6
Outlook	1
Style	1

Table 4. Newspaper section of articles in sample published in the *Washington Post*. For consistency, articles labeled as being published in the “FIRST SECTION,” which appeared prior to 1992, were recorded in this table as appearing in “A Section.”

While recognizing that general article styles and length vary between newspapers, the average length of the articles about rising temperatures that appeared in each paper provides interesting insight into how coverage of temperature trends varies across papers. Articles discussing rising temperatures were the longest in the *New York Times*, with an average word count of 683, followed by the *Washington Post*, with an average word count of 570. The average word count of articles in the *Wall Street Journal* and *USA Today* were markedly lower, at 456 words and 434 words, respectively (Figure 5). The average word count of all 105 articles in the sample was 564.

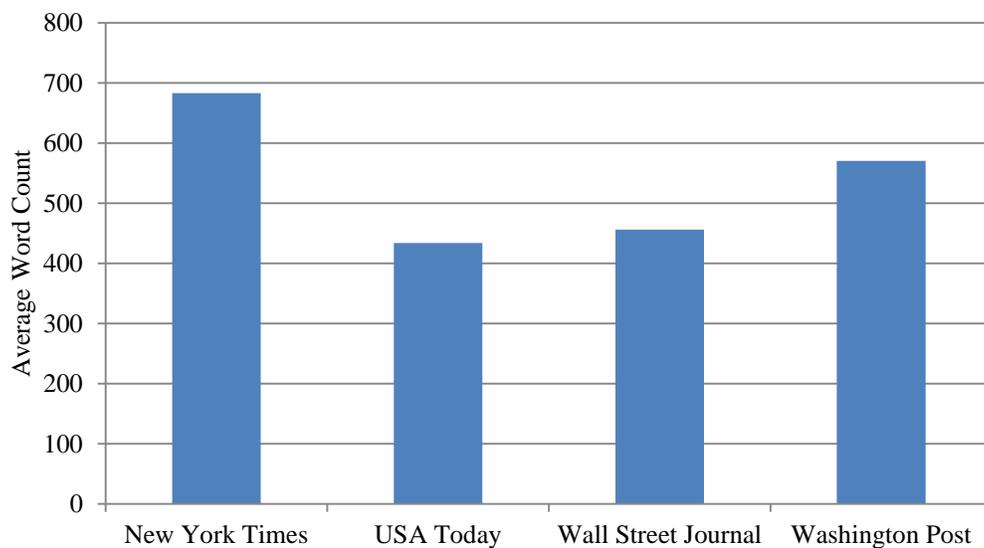


Figure 5. Average word count of articles focused on rising temperatures, by newspaper.

Readership of print newspapers tends to vary from day to day. The day of the week on which articles are published can therefore have a large impact on the number of people the content reaches. According to a 2012 study from the Newspaper Association of America, print newspapers tend to have the largest reach (or number of readers) on Sundays and the lowest reach on Mondays,

Tuesdays, and Saturdays.¹⁷¹ Across the four newspapers included in this sample, the largest number of articles about rising temperatures was published on Wednesdays and Fridays, with 22 and 23 articles respectively, followed by Tuesdays and Thursdays, with 16 and 17 articles respectively (Figure 6). The fewest articles were published on Mondays, Saturdays, and Sundays, with a respective 8, 9, and 10 articles.

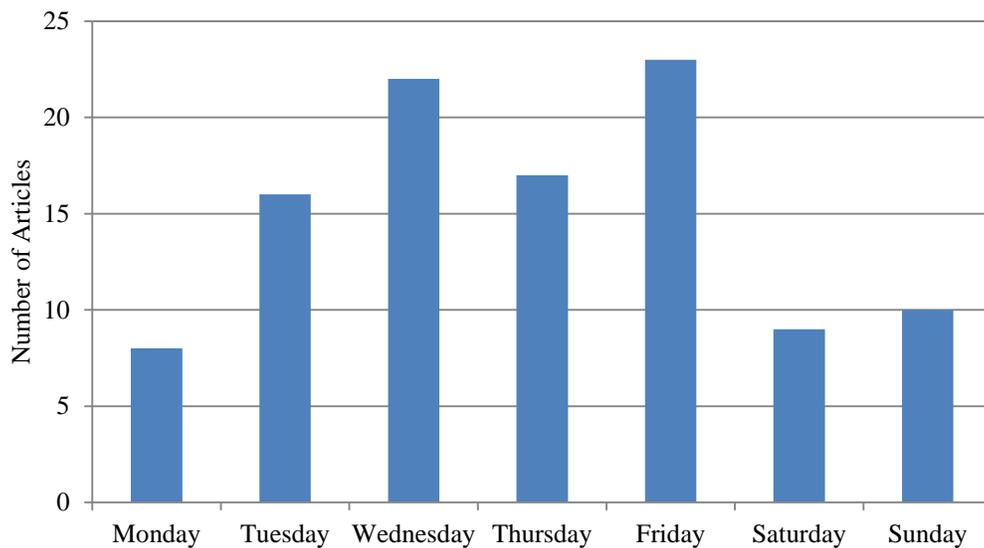


Figure 6. Number of articles published about rising temperatures by day of week.

In order to understand how rising temperatures are discussed in U.S. newspapers, the articles in this sample were coded based on their primary geographic focus – global, national, regional, state, or local. Although a number of articles discussed temperature trends at a variety of geographic scales (e.g. global trends *and* national trends), each article was assigned only one primary geographic focus based on the article title or, in cases where the article title did not reveal a specific geographic focus, the geographic focus that was predominant in the article body. Of the articles in the sample, the majority (70%) focused on

global temperature trends, followed by national trends (17%) and local trends (9%). Only 3% of articles focused on regional trends and 2% on statewide trends (see Figure 7).

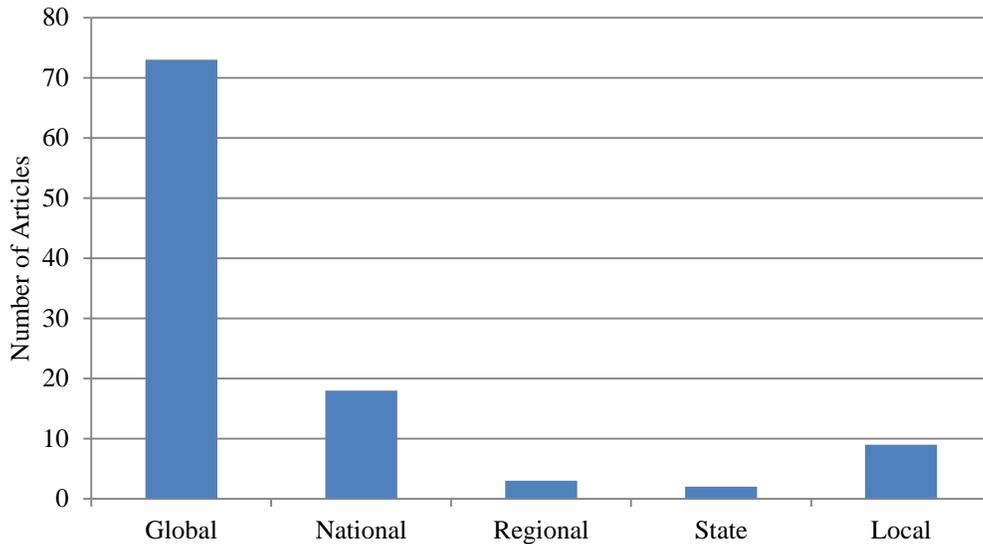


Figure 7. Number of articles about rising temperatures by primary geographic focus. All national articles focused on temperature trends in the United States or the lower 48 states. Regional articles discussed trends in multiple states, and articles classified as local discussed city- or district-wide (i.e. Washington, D.C.) trends.

The geographic focus of articles varied by newspaper, though global coverage dominated in all (see Figure 8). While national trends received the second highest amount of coverage in the *New York Times*, *USA Today*, and the *Wall Street Journal*, the *Washington Post* most prominently featured local trends. The *New York Times* was the only paper to publish articles focused on statewide trends, while the *Wall Street Journal* and the *Washington Post* were the only papers to include articles focused on regional trends.

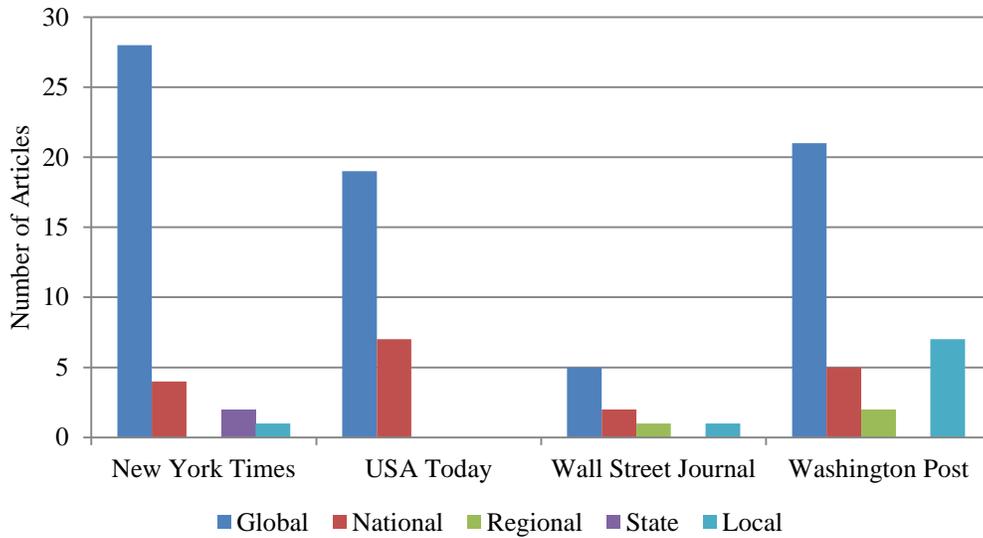


Figure 8. Primary geographic focus of articles, by newspaper.

The articles in this sample presented information about temperature trends over several different timeframes, including multiyear trends, annual trends, seasonal trends, and monthly trends (Figure 9). Although many of the articles discussed temperature trends over multiple timeframes (e.g. annual trends *and* monthly trends), each article was coded to reflect only the most dominant timeframe discussed in the article; this was determined based on either the article title or, if the article did not reference a specific timeframe, the timeframe that was predominant in the article body. The majority of articles included in this sample (69%) focused on annual temperature trends, while the numbers of articles focused on multiyear, seasonal, and monthly trends all hovered around the same level at 9%, 10%, and 12%, respectively.

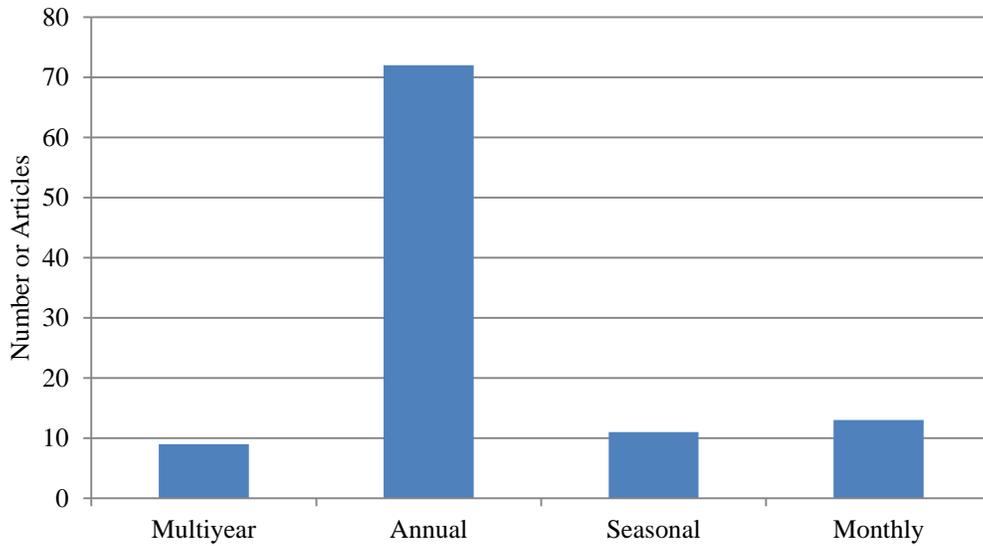


Figure 9. Number of articles about rising temperatures by primary timeframe.

When broken down by newspaper, we can see that annual trends made up the highest proportion of coverage in each paper (Figure 10). Although all papers also included at least several articles focused on seasonal temperatures, only the *New York Times*, the *Wall Street Journal*, and the *Washington Post* published articles that focused on multiyear trends. *USA Today* and the *Washington Post* were the only newspapers to include coverage of monthly trends.

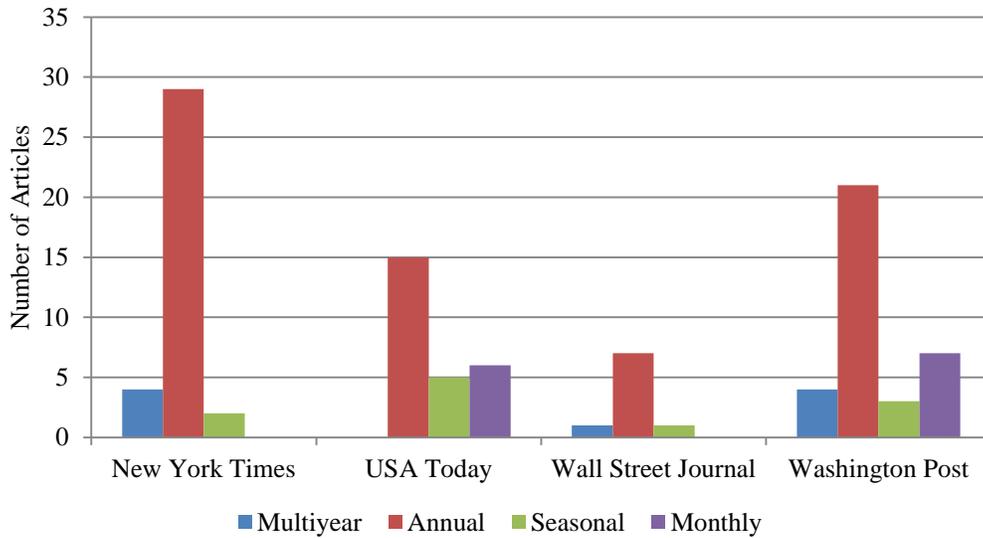


Figure 10. Number of articles about rising temperatures by primary timeframe and newspaper.

Of the 72 articles in this sample that focused primarily on annual temperatures, the year referenced in each article was also noted. This is particularly relevant because the year in which an article was published is not always the same as the year on which the article is focused (e.g. an article might have been published in early 2015 discussing the temperatures in 2014). When charted out over time, noticeable spikes in coverage are visible in 1990, 1998, 2006 and 2007, 2010, 2012, and 2014 (Figure 11).

While Figure 11 illustrates fluctuations in the years covered by the articles in this sample, it is important to not read much into the apparent small amount of coverage of the year 2015. Many reports of annual temperatures over the past year are published in the first few days of January of the following year, meaning that temperature trends in 2015 were likely reported on in articles published in January 2016. Because the timeframe for this study ended on December 31, 2015, articles from early 2016 that referenced 2015 were not captured in this sample.

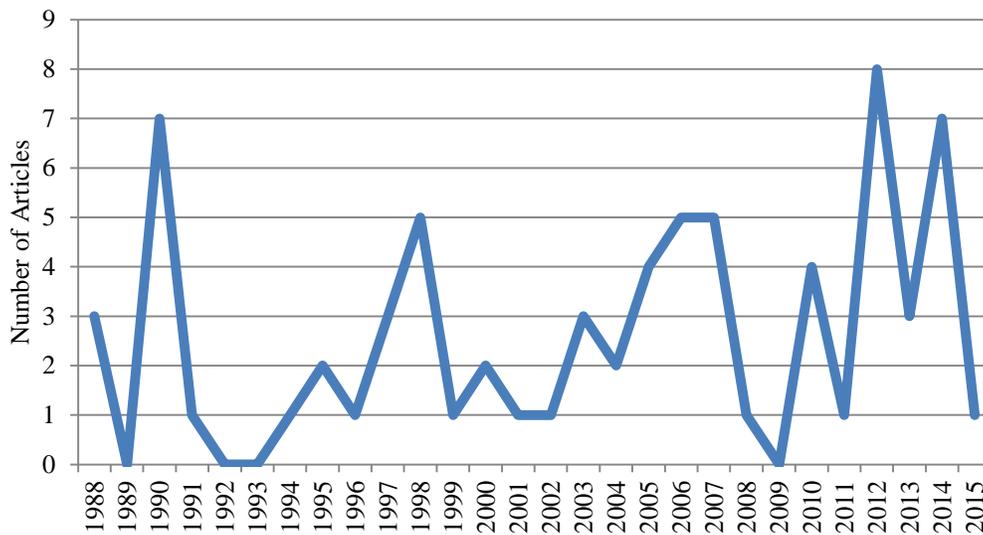


Figure 11. Years referenced in articles primarily focused on annual temperature trends.

In order to begin exploring how articles focused on rising temperatures connect temperature trends to climate change, the titles of all articles included in this sample were studied for explicit mentions of climate change or global warming. 11 of the 105 articles in this sample (10.5%) mentioned global warming or climate change in the title, and the percent of article titles mentioning these issues was remarkably consistent across newspapers (Figure 12). 11% of articles from the *New York Times*, the *Wall Street Journal*, and the *Washington Post* mentioned global warming or climate change in the title, while slightly fewer, 8%, of *USA Today* articles mentioned these issues.

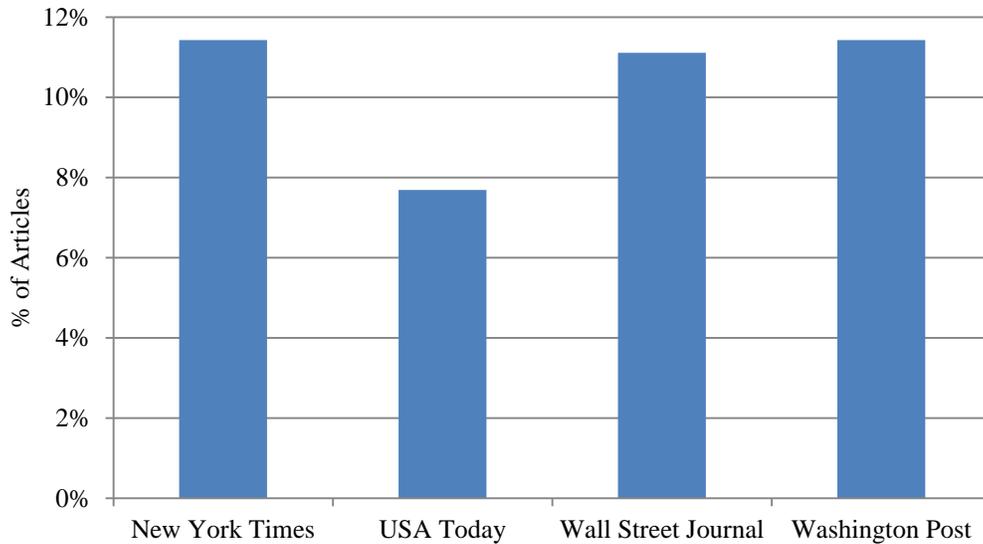


Figure 12. Percent of articles with titles explicitly mentioning global warming or climate change, by newspaper.

While a relatively small percentage of articles explicitly referenced climate change or global warming in their titles, the vast majority of articles in this sample (78%) did mention climate change and/or global warming in the article body, with variation by newspaper (Figure 13). 89% of articles in the *Wall Street Journal* (which notably made up a relatively small portion of the overall sample – Figure 3) mentioned climate change and/or global warming in the article body, and 86% and 80% of articles in the *New York Times* and the *Washington Post*, respectively, mentioned these issues. A relatively smaller portion, but still a majority, of articles in *USA Today* mentioned climate change and/or global warming, at 62%.

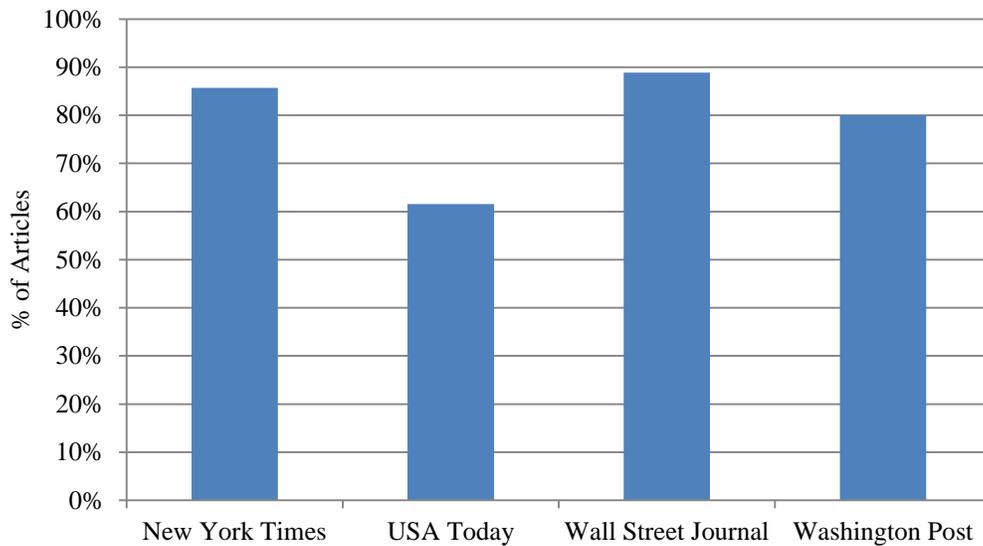


Figure 13. Percent of articles in the sample that mentioned global warming and/or climate change in the article body, by newspaper.

Though they may seem synonymous, and indeed are referenced together in much of this paper, a 2014 report from the Yale Project on Climate Change Communication found that the terms “global warming and climate change are often not synonymous—they mean different things to different people—and activate different sets of beliefs, feelings, and behaviors, as well as different degrees of urgency about the need to respond.”¹⁷² A study of Google searches by Americans between 2004 and 2014, for example, found that individuals more frequently searched for “global warming” than “climate change.”

To understand how these terms are used in newspaper articles about rising temperatures, a keyword search of the terms “climate change” and “global warming” was conducted of all articles in the sample using the “find” tool in Microsoft Word. Consistent with the findings of past studies, this search revealed that articles about rising temperatures published in the *New York Times* and *USA Today* were more likely to use the term “global warming” than “climate change.”

Of the total mentions of both terms in the *New York Times* and *USA Today*, a respective 73% and 74% were of “global warming,” while only 27% and 26% were of “climate change” (Figure 14). In contrast, articles in the *Wall Street Journal* and the *Washington Post* interestingly mentioned “global warming” and “climate change” nearly equally, with “global warming” respectively comprising only 55% and 53% of all mentions in the papers.

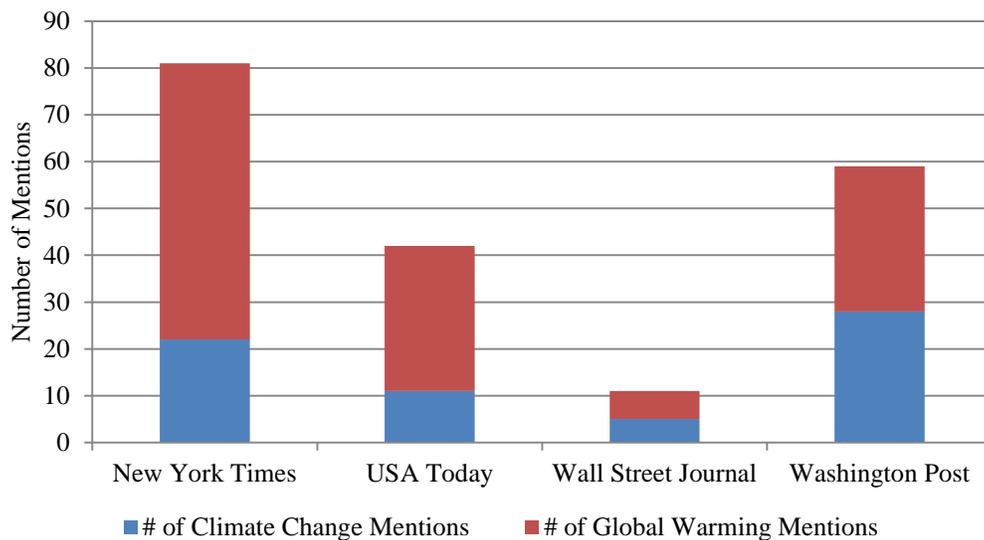


Figure 14. Number of mentions of the terms “climate change” and “global warming” in all articles in the sample, by newspaper.

To delve deeper into whether articles about rising temperatures talk about climate change, the body of each article in the sample was closely studied for discussions of the anthropogenic causes of climate change (e.g. the emission of greenhouse gases from the burning of fossil fuels). While 78% of articles made general reference to climate change and/or global warming, a smaller number of articles, but still a majority (63%), discussed the anthropogenic causes of climate change and/or global warming. Mirroring the trend in the general discussion of global warming and climate change in the sample, the highest percentage of

articles that discussed the anthropogenic causes of climate change was found in the *Wall Street Journal* (78%), followed by the *New York Times* (69%), the *Washington Post* (63%), and *USA Today* (50%) (Figure 15).

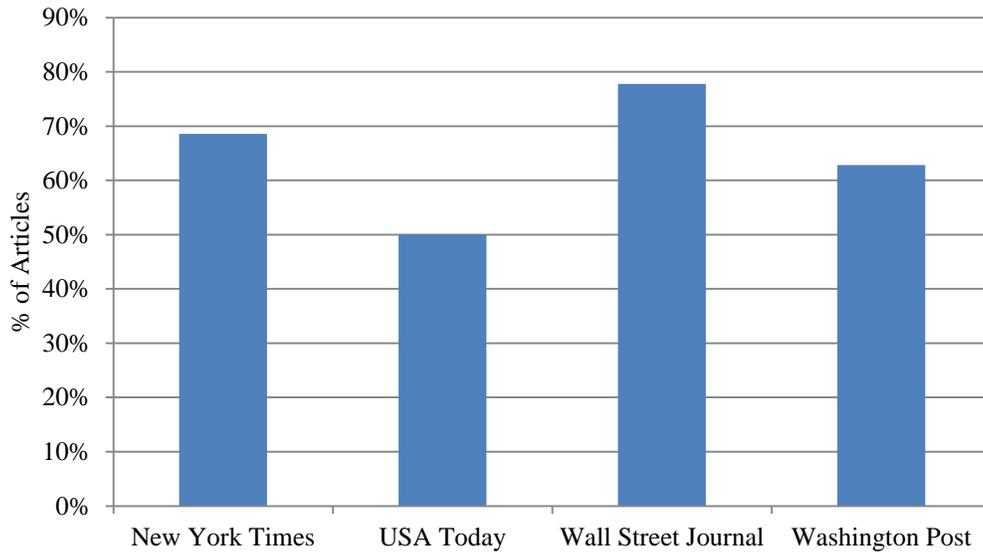


Figure 15. Percent of articles that discussed the anthropogenic causes of climate change (e.g. the emission of greenhouse gases from the burning of fossil fuels), by newspaper.

A much smaller number of articles in the sample discussed other impacts of climate change that extended beyond rising temperatures, with only 27% of articles explicitly noting other climate change impacts such as rising sea levels or more frequent extreme weather events. Although a number of articles included general discussions of other weather-related events and trends (such as droughts or precipitation levels), articles were only coded as discussing other impacts of climate change if the events or trends were directly and explicitly attributed to climate change in the article text.

Discussion of other climate change impacts varied from newspaper to newspaper. 40% of articles in the *New York Times* discussed other impacts of

climate change, followed by 24% of *USA Today* articles and 21% of *Washington Post* articles (Figure 16). Only 11% of articles in the *Wall Street Journal* discussed other climate change impacts. In addition to examining discussions of other climate change impacts, this study also studied other topics substantively discussed in the articles. While most articles covered other weather-related trends such as precipitation patterns, as noted above, approximately 30% of articles included substantive discussions of other non-weather-related issues, including political, economic, and, to a much lower extent, social issues.

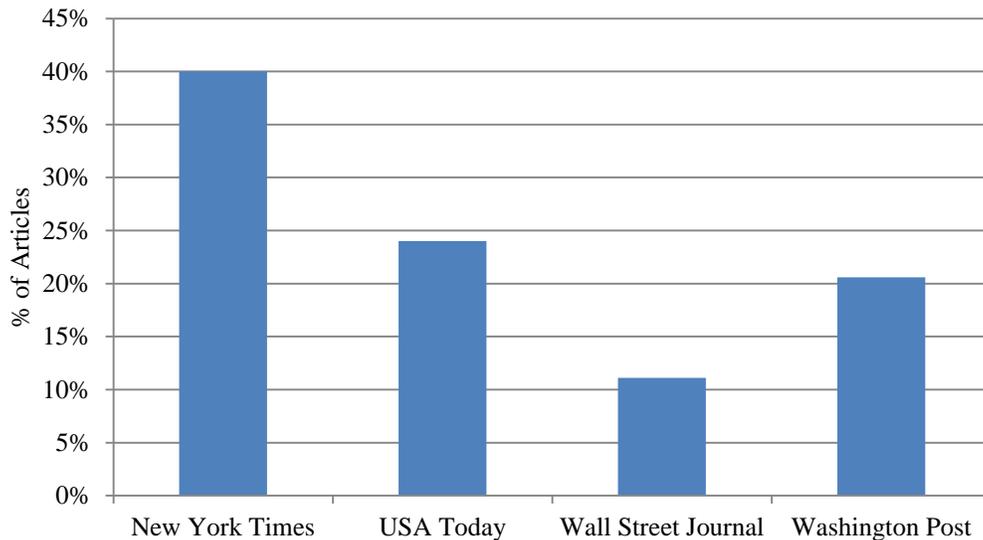


Figure 16. Percent of articles in sample that discussed other impacts of climate change (beyond rising temperatures), by newspaper.

The issue of “balance” in the media’s coverage of climate change has been one of the most prolifically studied topics in the field of climate change communications, as scholars have sought to understand the extent to which the media presents the anthropogenic contributions to climate change as an issue of settled science versus an unsettled debate. To explore the “balance” of reporting on climate change and global warming within articles about rising temperatures,

methodology from one of the most frequently cited articles on this topic was utilized. Articles in this sample that substantively discussed the root cause(s) of climate change or global warming (a total of 62 articles) were coded based on the following four categories of anthropogenic climate change coverage developed by Boykoff and Boykoff in their article “Balance as Bias: Global Warming and the U.S. Prestige Press.”¹⁷³ For ease of coding, the shortened category descriptors – “exclusive anthropogenic,” “anthropogenic dominant,” “balanced,” and “anthropogenic skeptical” – were developed for this study.

- Exclusive Anthropogenic – An article that “only presents [the] argument that anthropogenic global warming exists, clearly distinct from natural variations,” was coded as “exclusive anthropogenic.”
- Anthropogenic Dominant – An article that “presents both sides, but emphasizes that anthropogenic global warming exists, still distinct from natural variation,” was coded as “anthropogenic dominant.”
- Balanced – An article that “presents a balanced account of [the] debates surrounding [the] existence of anthropogenic global warming” was coded as “balanced.”
- Anthropogenic Skeptical – An article that “presents both sides, but emphasizes dubious nature of the claim that anthropogenic global warming exists” was coded as “anthropogenic skeptical.”

Of the four frames outlined above, the “anthropogenic dominant” frame was used most frequently in the articles included in this study (39%), followed by

the “exclusive anthropogenic” frame (34%), and the “balanced” frame (24%) (Figure 17). Only 3% of articles reflected the “anthropogenic skeptical” frame.

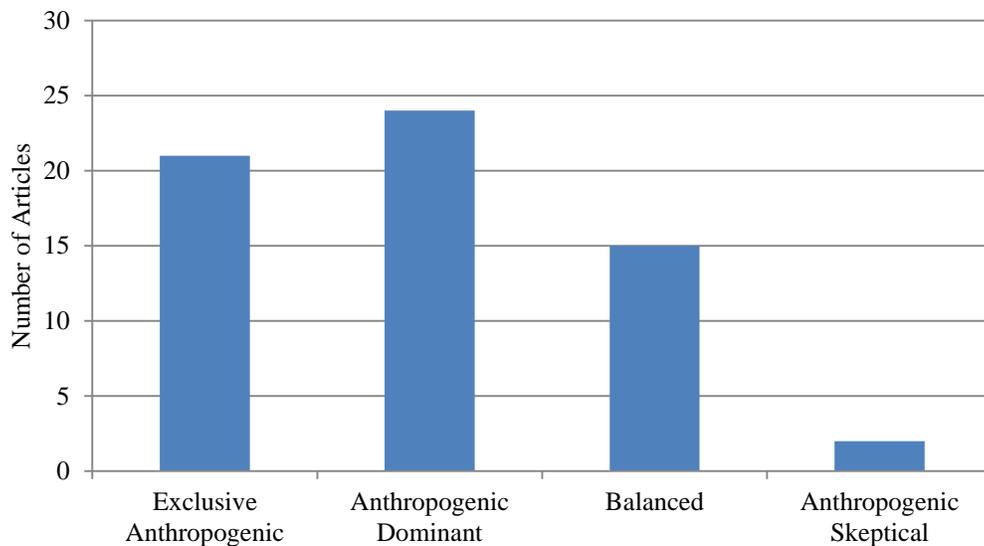


Figure 17. Framing of anthropogenic contributions to climate change.

An examination of the frames on a paper-by-paper basis reveals that newspapers differ in the frames they most frequently employ (Figure 18). During the period of time included in this study, the *New York Times* was dominated by articles using the “anthropogenic dominant” frame, while *USA Today* most frequently published articles using the “exclusive anthropogenic” and “balanced” frames. The *Wall Street Journal* most frequently employed the “anthropogenic dominant” and “balanced” frames, while the *Washington Post* most frequently published articles using the “exclusive anthropogenic” frame. Only *USA Today* and the *Washington Post* published articles using the “anthropogenic skeptical” frame, with just one article each.

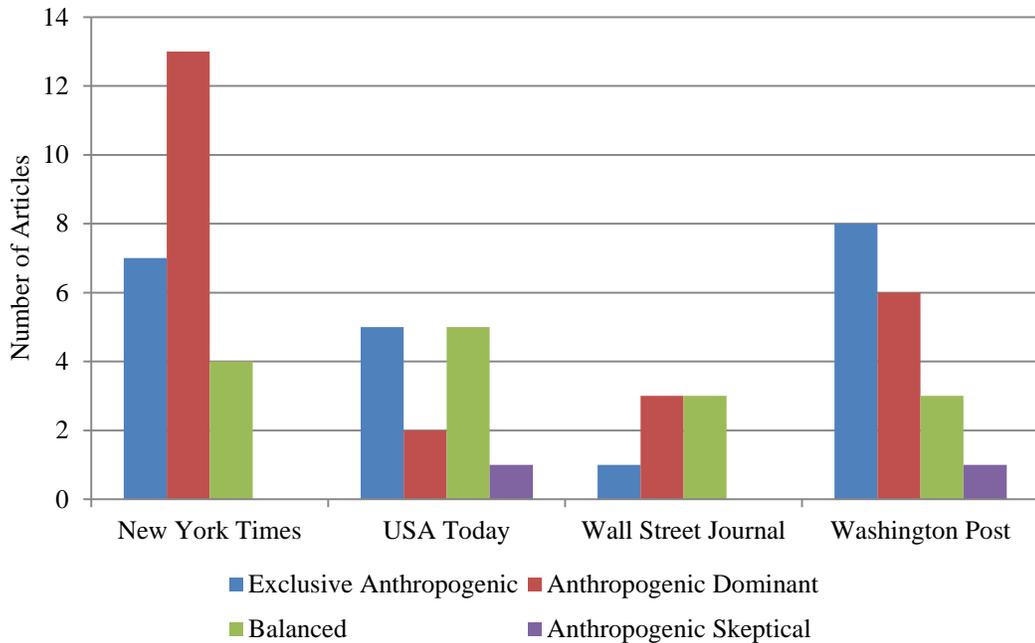


Figure 18. Framing of anthropogenic contributions to climate change, by newspaper.

The above discussion looked specifically at articles’ treatment of the anthropogenic contributions to climate change and whether or not humans contribute to global warming. While a number of articles included opinions of individuals or groups questioning humans’ influence on the climate, a number of articles also included opinions of individuals or groups questioning whether or not the Earth is even warming. 14 articles (13%) in this sample included quotes or perspectives from individuals who explicitly questioned the reality of global warming, expressing skepticism and doubt over whether or not the planet is actually getting hotter, the degree to which the planet is warming, and/or the urgency and severity of the alleged warming (Figure 19). While skepticism over the reality, degree, and urgency of the Earth’s warming fluctuated over time, 2015

interestingly saw the highest number of articles that cited global warming skeptics.

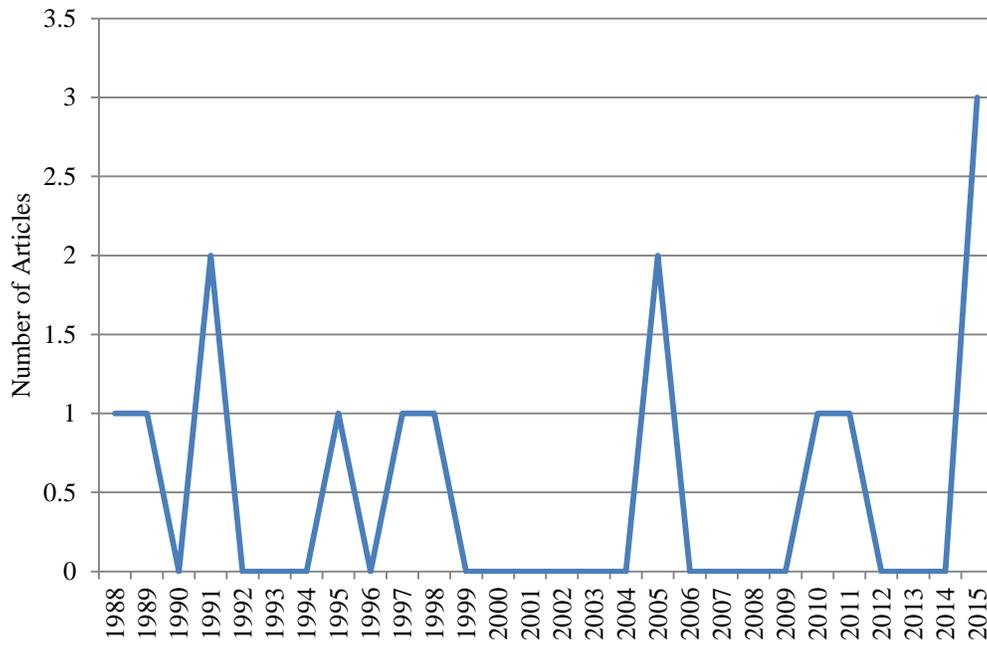


Figure 19. Number of articles citing global warming skeptics by year.

Discussion

In an effort to begin understanding the media's treatment and coverage of climate change in newspaper articles about rising temperatures, it is instructive to compare how trends in the coverage of rising temperatures in the print media compare to trends in the media's general coverage of climate change and global warming. Coverage of climate change and global warming in the print media has changed and morphed over time and been shown to vary from newspaper to newspaper, and this study revealed that in several ways trends in the general coverage of climate change and global warming are somewhat mirrored by trends in the coverage of rising temperatures.

According to the Center for Science and Technology Policy Research, which tracks newspaper coverage of climate change and global warming between 2000 and the present, the *New York Times* and the *Washington Post* tend to feature the highest number of articles about climate change and/or global warming, with *USA Today* and the *Wall Street Journal* historically featuring fewer articles about these topics (Figure 2). This study similarly showed that when it comes to rising temperatures, the *New York Times* and the *Washington Post* also featured the most articles about rising temperatures (35 articles each) (Figure 3). *USA Today* featured slightly fewer articles about rising temperatures (26), and the *Wall Street Journal* featured the fewest (9).

Past research has shown swells in the volume of media coverage of climate change and global warming over time, and these swells have often coincided with the release of major climate change reports and with international

climate summits (Figure 2). Coverage spiked, for example, in 1990 when the First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) was released and subsequently with the release of the IPCC Third Assessment Report in 2001 and Fourth Assessment Report in 2007. Noticeable increases in coverage also coincided with the Earth Summit in Rio in 1992, the U.N. climate summits in Kyoto in 1997, Bonn in 2001, Bali in 2007, and Copenhagen in 2009, and ahead of the Paris climate talks in 2015. In several instances, the swells in coverage of articles about rising temperatures found in this study coincided with spikes in the general coverage of climate change and global warming. These spikes most noticeably converged in 1990 and 2007, suggesting that there perhaps exists a relationship between coverage of rising temperatures and the release of climate change reports and/or international climate conferences (Figure 20).

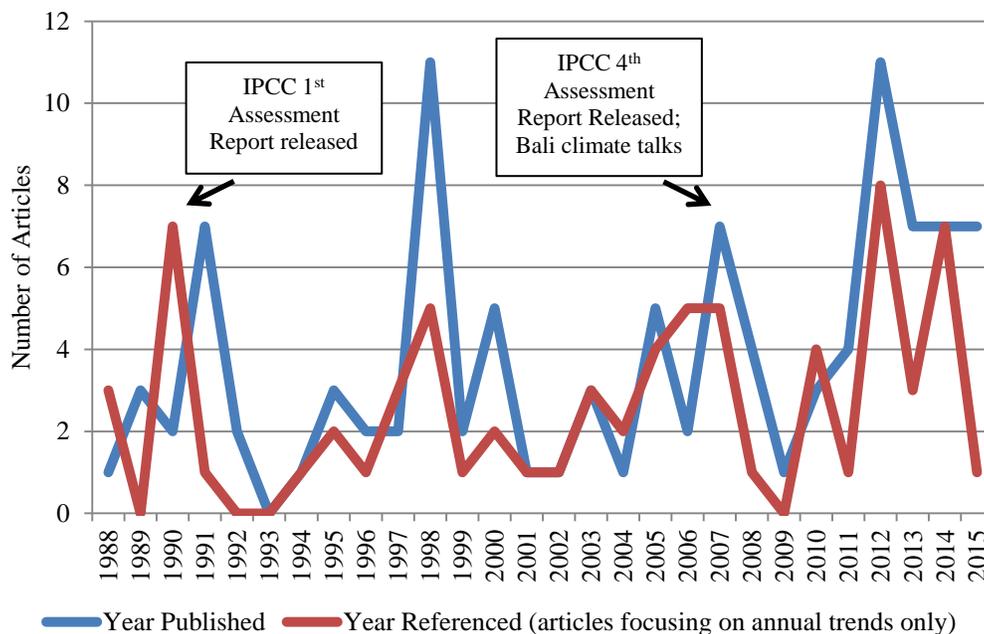


Figure 20. Years published of all articles in the sample overlain with the years referenced in articles that were primarily focused on annual temperature trends. Annotated to show major climate change and global warming events.

It is also interesting to explore the relationship between annual temperature records and coverage of rising temperatures in the print media. Table 5 shows the 11 hottest years on record, globally, since recordkeeping began in the late 1800s. As Figure 21 depicts, spikes in the number of newspaper articles about rising temperatures coincide in numerous instances with years that saw record-setting high temperatures, including 1998, 2007, 2012, and 2014. While it is possible that major climate change events may influence the volume of coverage about rising temperatures in U.S. newspapers, it appears that media coverage of rising temperatures may be more strongly and/or directly influenced by actual temperature trends and, particularly, years experiencing record-setting heat.

Rank (1 = Warmest)	Year
1	2015
2	2014
3	2010
4	2013
5	2005
6 (tie)	1998
6 (tie)	2009
8	2012
9 (tie)	2003
9 (tie)	2006
9 (tie)	2007

Table 5. The 11 warmest years on record, globally, from 1880 – 2015 based on global combined land and ocean annually-averaged temperatures.¹⁷⁴

As previously noted, it is necessary to recognize that, despite overtaking 2014 as the hottest year on record, the low number of articles referencing 2015 is likely a result of the fact that many articles reporting on annual temperature trends are published at the beginning of the following year. This would mean that

articles reporting on temperature trends in 2015 were likely published in early 2016, which fell outside of the bounds of this study.

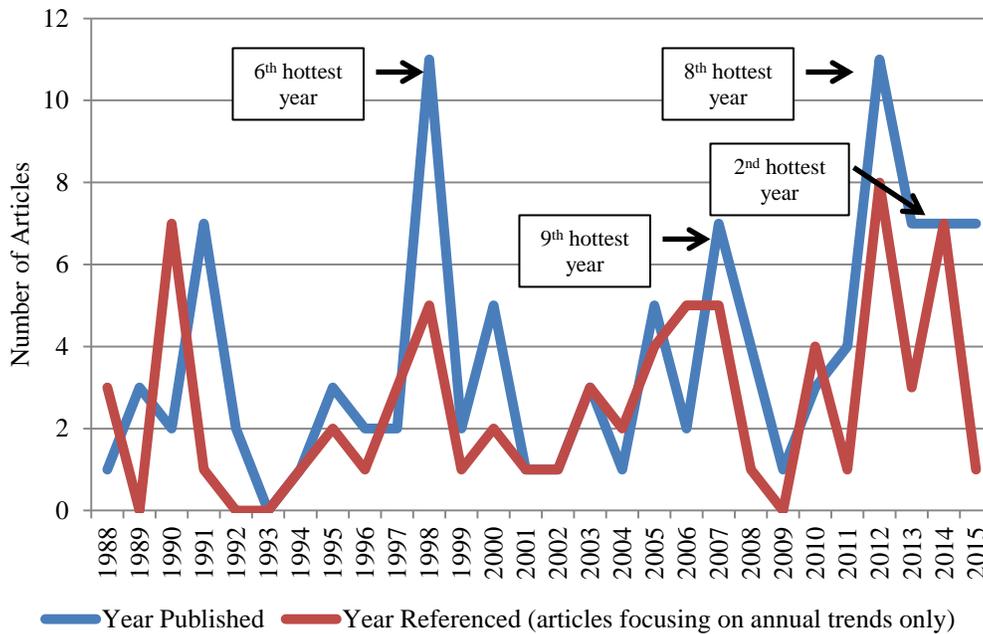


Figure 21. Years published of all articles in sample and years referenced in articles focused primarily on annual temperatures. Annotated to show years that set annual global heat records.

While the number of articles about rising temperatures published in newspapers has fluctuated from year to year, so too has the percent of articles that directly discuss global warming and/or climate change. The fluctuations in the percent of articles discussing these issues, however, seem to follow a more cyclical pattern over time, reminiscent, perhaps, of the issue-attention cycle theory. As visible in Figure 22, the issue of climate change was consistently featured in nearly 100% of all articles during the 10-year period between 1996 and 2006. With the exception of several other spikes during the 28-year period covered in this study, the coverage of climate change in articles about rising temperatures outside of this 10-year period waned.

If we choose to entertain the possibility of an issue-attention cycle, Downs' theory would label the period of time between 1995-1996, during which discussions of climate change and/or global warming emerged in nearly all articles about rising temperatures, as the "alarmed discovery and euphoric enthusiasm" phase, the second phase of the issue-attention cycle. It would be during this stage, Downs would argue, that the issue of climate change captured the public's attention, potentially through an alarming event or series of events. Events potentially influencing the prominence of climate change discussions at this time could have included the first meetings of the Conference of the Parties (COP) to the United Nations Framework Convention of Climate Change (UNFCCC) in Berlin in 1995 and Geneva in 1996 and the release of the IPCC's Second Assessment Report in 1996.

While this is an intriguing application of this popular theory, it is necessary to note that the number of newspaper articles in this sample is relatively small (105) and that this same "cycle" does not seem to be as prominent when looking at the print media's general coverage of climate change over time (Figures 1 and 2). Subsequent research, however, could further analyze a possible issue-attention cycle from 1996-2006 by studying public opinion data during the same period to see if the proliferation in discussions of climate change in articles about rising temperatures in any way aligned with increased knowledge or action by the public on the issue of climate change.

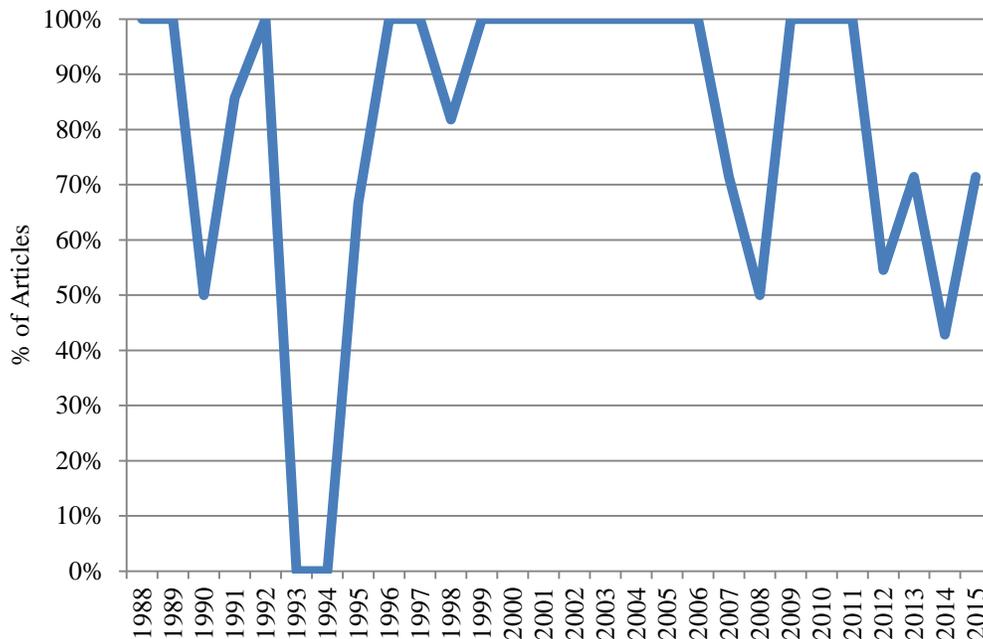


Figure 22. Percent of articles in sample that discussed global warming or climate change in the article body, by year.

While outside factors such as climate change-related events may influence article’s inclusion of climate change and/or global warming, it appears that one of the biggest determinates of whether or not an article about rising temperatures also discusses climate change and/or global warming in the article body may be article length. The average length of all articles in this sample was 565 words. In examining just the articles in the sample that discussed global warming or climate change in the article body, however, average article length rose to 640 words, and when examining just articles that did *not* discuss global warming or climate change in the article body, average article length fell precipitously to 298 words (Figure 23).

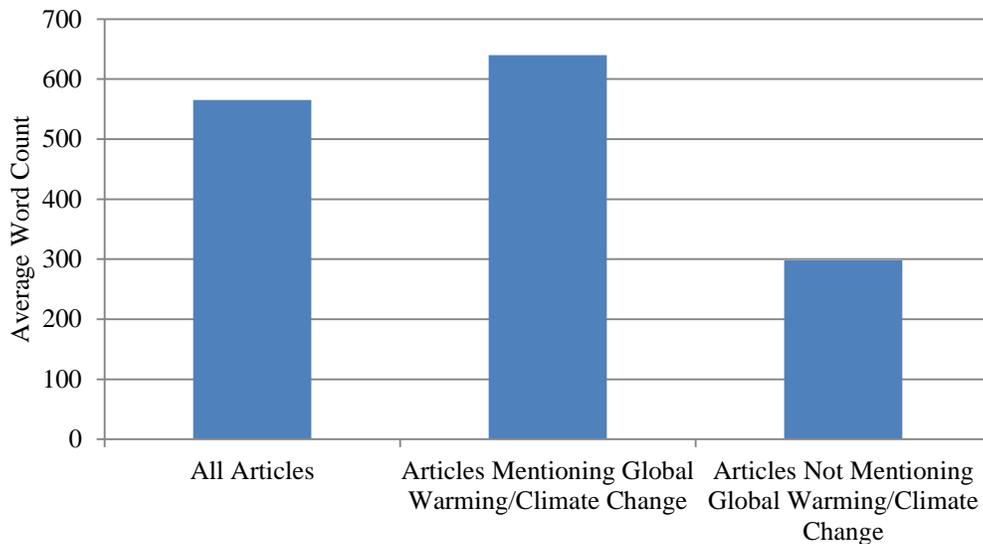


Figure 23. Average word count of all articles in sample, as well as articles that discussed global warming or climate change in the article body and those that did not.

An extensive amount of past research has studied coverage of the anthropogenic contributions to climate change in articles about climate change and global warming in the U.S. print media and charted trends and changes in the “balance” of coverage over time. As previously described, in a study of coverage between 1988 and 2002, Boykoff and Boykoff found that articles presenting “balanced” accounts of the “debate” surrounding anthropogenic contributions to global warming dominated, comprising 52.65% of their sample. 35.29% of articles discussed both natural variation and anthropogenic global warming but emphasized human contributions to the issue (“anthropogenic dominant”), and 6.18% presented both sides but conversely expressed doubt over anthropogenic global warming (“anthropogenic skeptical”). Only 5.88% of articles exclusively attributed global warming to humans (“exclusive anthropogenic”).¹⁷⁵ A follow-up study, however, showed that “balanced” accounts of global warming fell off

between 2003 and 2006, comprising 33% of articles in the sample in 2003 but just over 3% in 2006.¹⁷⁶

While “balanced” accounts dominated general coverage of climate change and global warming in the print media between 1988 and 2002, this study showed that “balanced” accounts were also relatively prominent during the same period in articles about rising temperatures (Figure 24). While they were more prominent, however, than “exclusive anthropogenic” or “anthropogenic skeptical” accounts, it was the “anthropogenic dominant” frame that was most widely used in articles about rising temperatures published during this time period. This finding suggests that when it comes to discussing climate change in the context of rising temperatures, human contributions to the problem have historically been more heavily emphasized than in articles focused on climate change and global warming generally.

More clearly mirroring trends in previous research, this study also found that “exclusive anthropogenic” and “anthropogenic skeptical” accounts were present in only a very small portion of articles published between 1988 and the early 2000s, with “anthropogenic skeptical” accounts falling off completely in the mid-1990s (Figure 24). Also consistent with past research, this study revealed an apparently slight decline in the number of “balanced” accounts over time, accompanied by a marked increase in number of “exclusive anthropogenic” accounts starting in the early 2000s. This finding is quite significant, as it shows that in articles about rising temperatures, attribution of climate change to anthropogenic influences has become more common over time, with the scientific

consensus on the existence of anthropogenic climate change being reported more accurately.

It is also relevant to note that, if anything, this sample is likely skewed toward the “anthropogenic dominant” and “balanced” accounts and *away* from the “exclusive anthropogenic” accounts due to the subject matter of the articles included in this sample. While the influence of greenhouse gas emissions on rising temperatures is well documented, so too is the influence of “natural” phenomena such as El Niño, particularly when examining temperatures over a single year or season. A number of articles in this sample (38) discussed the influence of El Niño on temperatures, and although these articles didn’t necessarily refute anthropogenic climate change, many did explicitly cite El Niño as an example of a natural influence over temperatures.

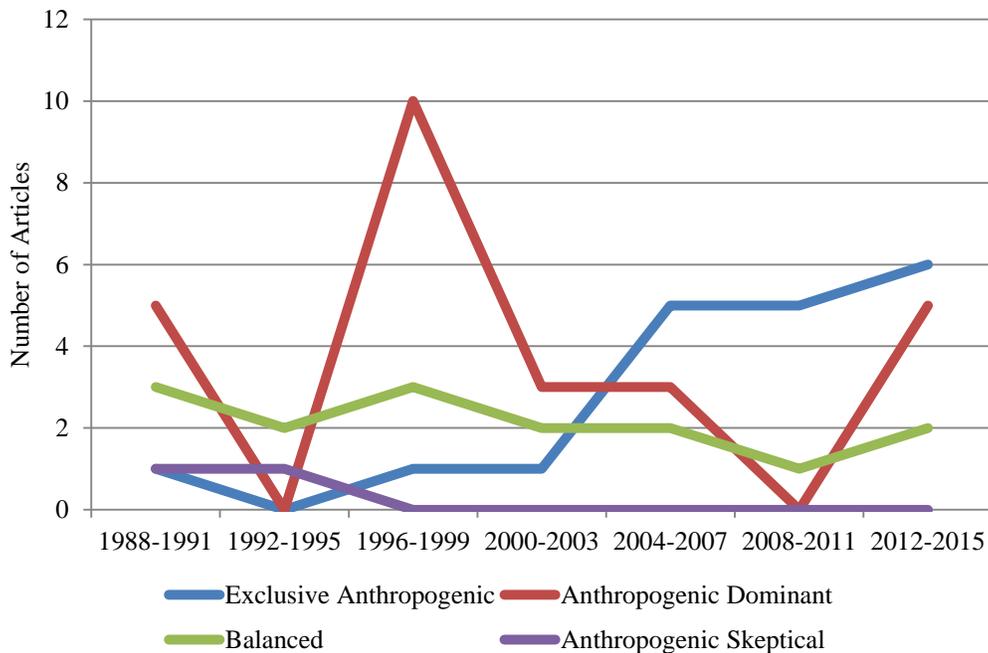


Figure 24. Changes in the coverage of anthropogenic contributions to climate change over time.

While 78% of articles in this sample mentioned climate change in the article body, only 27% explicitly discussed other impacts of climate change (beyond rising temperatures), demonstrating that the level of detail and depth articles about rising temperatures actually provide about climate change is quite limited. When exploring the other impacts of climate change that articles do mention, this study also reveals that the various well-documented impacts of climate change are not reported on equally (Table 6). Notably, “weather-related” impacts and impacts on the Earth’s physical environment, such as droughts, precipitation, floods, storms, heat waves, melting ice and glaciers, sea level rise, and forest and wildfires are mentioned with relative frequency, while economic, social, and health impacts, such as social and economic dislocation and impacts on development, are mentioned much less frequently. It is particularly striking to note that social justice concerns, impacts on vulnerable populations, and social and political unrest were absent from articles’ discussions of climate change impacts with the exception of only one article.

<u>Impact</u>	<u>Number of Articles Mentioned</u>
Melting ice, glaciers, permafrost, and/or sea ice	14
Sea level rise	13
Droughts	13
Precipitation (heavier, changing patterns)	10
Flooding	9
Agricultural impacts	7
Storms (including hurricanes)	6
Heat waves	5
Economic impacts and dislocations	3
Dying forests	2
Plant and animal extinction and/or habitat loss	2
Wildfires and/or forest fires	2
Extreme weather	2

Biological systems	1
Food emergencies	1
More skin cancer deaths	1
Development	1
Social dislocation	1

Table 6. Other impacts of climate change (aside from rising temperatures) mentioned in articles.

In order to gain further insight into how rising temperatures are connected to climate change in the print media, articles in this sample were also studied for the other key non-weather-related issues they discussed. Only approximately 30% of articles included substantive discussions of other non-weather-related issues, which can be classified into three key categories – political, economic, and social. Of these other issues, political and policy-related topics dominated, particularly those on an international and national level. These issues were also, in essentially every case, explicitly related and tied directly to climate change. 13 articles discussed international climate conferences and climate agreements; the annual United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) summits were frequently mentioned, particularly those in Paris, Copenhagen, Lima, Doha, and Cancun, along with the international Kyoto Protocol climate treaty. Slightly fewer articles, 11, discussed domestic policy, such as congressional legislation, the EPA endangerment finding that paved the way for federal regulation of carbon dioxide emissions, and the subsequent Clean Power Plan to regulate emissions from power plants. Only one article in the sample included a substantive mention of local policy – actions by

New York City Mayor Michael Bloomberg and the city government on climate resiliency.

While the economic impacts of climate change were referenced in several articles, a few articles also incorporated broader discussions of economic issues and impacts, though they appeared with less frequency than political and policy-related issues. Four articles discussed the high cost and impact of extreme weather events such as floods, hurricanes, and cyclones and implications for the insurance industry. Three articles discussed energy supply and demand issues associated with warmer temperatures, and three additional articles discussed the economic impacts of rising temperatures on recreation, such as ice fishing and snowmobiling. While articles framed the political issues mentioned as directly related to climate change, the economic issues discussed were largely framed as related to or directly resultant from extreme weather events *without* making explicit connections to climate change.

Social issues were essentially absent from articles' discussions of the impacts of climate change, and additional substantive discussions of social issues and social justice were also nearly absent from the articles in this sample. In the most explicit connection between climate change and impacts to vulnerable populations, one *Washington Post* article mentioned the World Meteorological Organization's efforts to "[establish] long-term monitoring systems and plans to help the countries most vulnerable to climate change."¹⁷⁷ Several articles mentioned the human death toll of extreme weather events, but no specific links were made between these impacts and climate change. Similarly, a 2015 *New*

York Times article mentioned the likelihood of growing political unrest in tropical countries but framed the issue as an impact of El Niño and made no mention of climate change, stating that “the effects can be profound, with some research even suggesting that civil wars become more likely in tropical countries when they are under stress from an El Niño.”¹⁷⁸

Conclusion

With general trends and insights into the coverage of global warming and climate change in the media well-researched and established in the academic literature, this study sought to explore the under-researched topic of how climate change is discussed within the context of newspaper articles about rising temperatures, one of the most well-documented impacts of climate change. A content analysis of articles focused on rising temperatures published in the *New York Times*, *USA Today*, the *Wall Street Journal*, and the *Washington Post* between 1988 and 2015 revealed that in several cases trends in the coverage of rising temperatures seem to somewhat mirror trends in the general coverage of global warming and climate change in the print media, with several similar swells in the volume of coverage of both topics seen over time along with similar patterns in the “balance” of coverage.

Perhaps more substantially, this study demonstrated that the media does overwhelmingly tend to connect the topic of rising temperatures to the issue of climate change, as the majority of articles in this sample explicitly discussed climate change and/or global warming in the article body. At first glance, with such clear ties being made between rising temperatures and climate change, this finding could seem to be an example of agenda-setting by the media, with the potential to raise the priority of climate change on the public agenda. Due to the relatively small number of articles in this sample (105) over the 28-year period covered by this study, however, it seems doubtful that media’s efforts to highlight climate change in articles about rising temperatures would alone have a dramatic

influence over the public's knowledge and perception of the issue or be a substantial driver in pushing the issue of climate change onto the public agenda. While public opinion polls indicate that Americans' general concern over climate change and global warming is rising, the low level of apparent resonance that these issues continue to experience among the American public when compared to other national problems would seem to confirm this supposition.

Furthermore, despite the overwhelming inclusion of climate change in articles about rising temperatures, this study revealed that articles' discussions of climate change lacked significant depth and detail. Only approximately one-third of articles mentioned other impacts of climate change, and a similar number discussed other political, social, and economic issues. Even where included, however, these discussions and mentions were quite cursory. In one of the most substantial, striking, and troublesome findings of this study, it was discovered that with only a couple of exceptions, the social impacts of climate change, including social justice, political unrest, and impacts to vulnerable populations, were absent from articles about rising temperatures.

This introductory study revealed valuable findings about how climate change and global warming are portrayed in the print media in the context of rising temperatures, but it is necessary to acknowledge that because this study examined a narrow set of articles and topics, its results are not necessarily indicative of the media's general treatment of climate change and its impacts. This study, therefore, leaves ample opportunity for future research and in-depth analysis to better understand coverage of climate change in this context. This

includes, but is not limited to, further exploration of what factors influence whether or not newspaper articles about rising temperatures draw connections to climate change and how coverage of climate change in articles about rising temperatures influences the public's perception and knowledge of climate change impacts and the causal relationship between climate change and rising temperatures.

Several past studies exploring media coverage of climate change have supplemented content analyses of newspaper articles with interviews of journalists, which has allowed researchers to gain a deeper and more nuanced understanding of what impacts and drives coverage and journalistic decisions over climate change content and issue-framing. This study speculated on factors that might influence coverage of climate change in articles about rising temperatures, such as article length and climate change-related events, and noted other striking findings such as the overwhelming omission of social issues from these articles. Additional research, such as through in-depth interviews with journalists, would be invaluable for gaining a better understating of the influences and drivers that underlie journalistic decision-making on the coverage of climate change and rising temperatures.

In an effort to better understand coverage of climate change in the media, future studies could also explore how climate change is talked about in relation to other climate change impacts and how coverage varies by news media type. To explore how the media draws connections between climate change and its impacts, rising temperatures were used to frame this study, as rising temperatures

are one of the most well-documented and directly attributable impacts of climate change. As this study has discussed, however, rising temperatures are not the *only* impact of climate change. Future studies examining connections between climate change and other climate change impacts, such as rising sea levels or extreme weather events, could help draw a more complete picture of how the media covers climate change and how the public receives information about climate change and its impacts.

Similarly, due to ease of analysis and in accordance with much past research, this study examined coverage of climate change and rising temperatures in the print media. Clearly, however, newspapers are not the only source from which the public receives information. Examinations of how climate change and the impacts of climate change are covered by other media sources could also help draw a much more comprehensive and robust picture of the media's reporting on the issue.

Finally, the human toll and social justice impacts of climate change are well-documented. Quite notably, however, this study found that articles about rising temperatures very rarely discussed or even alluded to the social impacts of climate change, including social justice concerns, impacts to vulnerable populations, and political unrest and instability; discussion of the human toll of climate change was, troublingly, absent from the articles in this sample with only a couple exceptions. Because this study analyzed only a small number of articles on just one impact of climate change, future research exploring how these seemingly underrepresented issues are discussed in general coverage of climate

change and global warming would also add a significant new element to the overall understanding of how climate change is reported in the media.

With the warmest global temperatures on record and 10 climate disasters and weather events with losses exceeding \$1 billion each in the United States alone,¹⁷⁹ the year 2015 reinforced the fact that the effects of climate change are already being felt and that swift and sweeping action from nations and actors across the world is required to address the issue and mitigate its impacts. In recognition of this fact, as 2015 came to a close, 195 nations reached a landmark agreement to keep global temperature rise below 2 degree Celsius during the COP21 United Nations climate change conference in Paris in December.¹⁸⁰ But even in light of such historic steps forward, the issue of climate change has continued to experience low saliency among the American public as an urgent and important national priority, while a substantial number of the top elected officials in the United States, an estimated 50%+ of Republican members of Congress, continue to question or outright deny the existence of anthropogenic climate change.¹⁸¹

Given these rather troubling and persistent dynamics, the vital role of the media in providing the American public with informed and accurate information about climate change is only heightened. Indeed the mass media, including the print media, has been the public's key source of information about scientific and political matters, and public awareness and comprehension of climate change has been found to be heavily influenced by and dependent on media coverage. These findings underscore the fact that the media can, and arguably should, play a

central and intentional role in informing the public about not only the issue of climate change but in helping the American public to draw connections between climate change and its causes and impacts, particularly those so clearly experienced by Americans in their daily lives, such as rising temperatures.

Appendix A: List of Newspaper Articles Included in Sample

<u>Article Title</u>	<u>Newspaper</u>	<u>Date</u>	<u>Day</u>	<u>Length</u>	<u>Section</u>
Temperature For World Rises Sharply In the 1980's	The New York Times	3/29/88	Tues.	1219	Section C
2014 Breaks Heat Record, Challenging Global Warming Skeptics	The New York Times	1/17/15	Sat.	1238	Section A
Figures on Global Climate Show 2010 Tied 2005 as the Hottest Year on Record	The New York Times	1/13/11	Thurs.	430	Section A
Separate Studies Rank '90 As World's Warmest Year	The New York Times	1/10/91	Thurs.	1249	Section A
Ever-So-Slight Rise in Temperatures Led to a Record High in 1997	The New York Times	1/9/98	Fri.	971	Section A
Global Warmth In '88 Is Found To Set a Record	The New York Times	2/4/89	Sat.	922	Section 1
Global Climate Stayed Warm in 1996, With Wet, Cold Regional Surprises	The New York Times	1/14/97	Tues.	1606	Section C
Agency Confirms 2014 as Hottest, but Just Barely	The New York Times	2/3/15	Tues.	187	Section A
Agency Confirms 2014 as Hottest, but Just Barely	The New Your Times	3/3/15	Tues.	187	Section A
Not Even Close: 2012 Was Hottest Ever in U.S.	The New York Times	1/9/13	Weds.	882	Section A
In the U.S. Last Year, the Heat Was On	The New York Times	1/3/91	Thurs.	947	Section A
Past Decade Was Warmest Ever, NASA Finds	The New York Times	1/22/10	Fri.	495	Section A
Global Temperature at a High For the First 5 Months of 1998	The New York Times	6/8/98	Mon.	1144	Section A

A Global Warming Resumed in 1994, Climate Data Show	The New York Times	1/27/95	Fri.	1115	Section A
1999 Continues Warming Trend Around Globe	The New York Times	12/19/99	Sun.	1614	Section 1
2013 Listed as One of the Warmest Years on Record	The New York Times	1/22/14	Weds.	119	Section A
95 Is Hottest Year on Record As the Global Trend Resumes	The New York Times	1/4/96	Thurs.	1115	Section A
Earth Temperature in 1998 Is Reported at Record High	The New York Times	12/18/98	Fri.	791	Section A
2015 Likely to Be Hottest Year on Record	The New York Times	10/22/15	Thurs.	960	Section A
U.S. Weather Follows Global Warming Trend	The New York Times	12/20/00	Weds.	537	Section A
Headliners; All Right, Who Turned Up the Heat?	The New York Times	1/13/91	Sun.	393	Section 4
U.N. Agency Says 2012 Ranks Among Hottest Years	The New York Times	11/29/12	Thurs.	532	
Global Warming Trend Continues in 2006, Climate Agencies Say	The New York Times	12/15/06	Fri.	549	Section A
Record Temperatures Favor Golfers, Not Skiers	The New York Times	1/7/07	Sun.	338	Section 14NJ
2004 Was Fourth-Warmest Year on Record	The New York Times	2/10/05	Thurs.	362	Section A
Superlative for the Old Year: It Was New York's Warmest	The New York Times	1/1/91	Tues.	890	Section 1
This Year Was the 2nd Hottest, Confirming a Trend, U.N. Says	The New York Times	12/19/01	Weds.	417	Section A
National Briefing Science And Health:	The New York Times	11/22/05	Tues.	131	Section A

Wet And Warm In 2005					
Hot Spot in 2003? The Earth, U.N. Says	The New York Times	12/17/03	Weds.	150	Section A
World Briefing Europe: Britain: 2007 May Be World's Warmest Year	The New York Times	1/5/07	Fri.	63	Section A
New Data Shows Warming Increased in Last Decade	The New York Times	12/9/09	Weds.	762	Section A
December 17 - 23; Anyone Fleeing the Kitchen?	The New York Times	12/24/00	Sun.	102	Section 4
British Data Echoes U.S. Climate Report	The New York Times	1/27/15	Tues.	185	Section A
IN BRIEF; So Far, the State's Having Its Warmest Year Ever	The New York Times	11/15/98	Sun.	139	Section 14NJ
Warmest Winter Slips (on Ice) Into History	The New York Times	3/20/92	Fri.	1193	Section A
After Earth's Hottest Year, a planetary pledge drive	USA Today	12/30/14	Tues.	532	A.7
The heat is on: World sees warmest May on record; And El Nino could keep trend going	USA Today	6/24/14	Tues.	332	B.5
Globe stayed warm in January; Fourth warmest temps on record	USA Today	2/21/14	Fri.	323	A.3
One hot planet: Earth sets record in 2013; Fourth-warmest year, NOAA scientists say	USA Today	1/22/14	Weds.	363	A.2
Earth had its warmest November on record	USA Today	12/18/13	Weds.	251	A.2
Earth had 3rd-warmest May on record	USA Today	6/21/13	Fri.	248	A.2
Globe was warm in 2012, though not as hot as USA	USA Today	1/16/13	Weds.	352	A.5
2012 likely USA's	USA Today	12/7/12	Fri.	444	A.3

warmest year on record					
Summer 2012 was the USA's third-hottest; Scientist says season's widespread heat may signal climate change	USA Today	9/11/12	Tues.	480	A.3
No sweat: 1st half is hottest yet; More than 22,000 heat records have been set in six months	USA Today	7/10/12	Sun.	458	A.1
2010 tied with 2005 as Earth's warmest year; Temperature above average for 34 years	USA Today	1/13/11	Thurs.	583	A.2
The globe sizzles to record for the year	USA Today	7/16/10	Fri.	438	A.1
Winter forecast a mild one as temperatures get toastier; This year on track to break 2005's mark for warmest year on record	USA Today	11/26/07	Mon.	524	A.1
El Nino gives USA its hottest year in '06; Climate change enters as a factor	USA Today	1/10/07	Weds.	477	
USA near record high in a year of worldwide warm-weather aberrations	USA Today	1/8/07	Mon.	445	
2005 is warmest year on record for Northern Hemisphere, scientists say	USA Today	12/16/05	Fri.	522	A.2
2004 is 4th hottest year for world since 1861, U.N. report says	USA Today	12/16/04	Thurs.	409	A.2
2003 was among warmest years, according to climate	USA Today	12/17/03	Weds.	600	A.03

data reviews					
Warmer world driving weather; Drought was story in USA during a year that appears to be globe's 2nd-hottest on record	USA Today	12/18/02	Weds.	628	A.03
Earth continues warming trend Average temperature in 1998 hottest in more than a century	USA Today	1/12/99	Tues.	301	02A
July breaks worldwide temperature record	USA Today	8/11/98	Tues.	474	03A
1997 was the warmest year on record for planet Earth	USA Today	1/9/98	Fri.	282	03A
Winter went south this year	USA Today	3/17/95	Fri.	182	01A
94-'95 season may melt records	USA Today	2/3/95	Fri.	168	03A
World warms in September	USA Today	11/1/94	Tues.	124	12A
1990: WORLD'S WARMEST YEAR; Sizzler leaves many asking what's normal	USA Today	1/4/91	Fri.	1357	01A
Average Global Temperature in 1988 Was Warmest of Century, Study Says	The Wall Street Journal	2/6/89	Mon.	376	
Study Shows 1998 May Be Warmest In Past 1,200 Years	The Wall Street Journal	12/8/98	Tues.	276	B6
This Year Is Likely To Be Third Hottest; Warm Fall Is Cited -- - Many Scientists Say Trend To Higher Temperatures Is Due to Gas Emissions	The Wall Street Journal	12/4/03	Thurs.	593	A3
U.S. News: Last Year Tied 2005 For Hottest on Record	The Wall Street Journal	1/13/11	Thurs.	460	A3

City News: It's Official: It's Been Hot in the Northeast	The Wall Street Journal	8/8/12	Thurs.	234	A18
Sandy Aside, Weather Puts 2012 in Record Books	The Wall Street Journal	12/20/12	Thurs.	736	A21
U.S. News: Last Year Was the Warmest	The Wall Street Journal	1/9/13	Weds.	490	A4
U.S. News: In Study, Past Decade Ranks Among Hottest	The Wall Street Journal	3/8/13	Fri.	678	A2
World News: Groups Say '14 Was World's Warmest	The Wall Street Journal	1/17/15	Sat.	267	A6
World Temperatures Keep Rising With a Hot 2005	The Washington Post	10/13/05	Thurs.	1019	A Section
Hot in . . . everywhere: 2014 breaks all records	The Washington Post	1/17/15	Sat.	1124	A Section
Last year was warm, but no record-setter	The Washington Post	1/29/12	Sun.	190	Kidspost
2007 Among Hottest Years On Record; Scientists Blame Trend On Greenhouse Gases	The Washington Post	1/13/08	Sun.	723	A Section
July Was World's Hottest Month on Record; High Temperatures Fuel Global Warming Debate	The Washington Post	8/10/98	Mon.	432	A Section
Last Year Among Hottest On Record, Say Scientists	The Washington Post	1/12/08	Sat.	721	A Section
July tops the hot list	The Washington Post	8/9/12	Thurs.	579	A Section
Feeling cold today? Just wait awhile.	The Washington Post	1/26/14	Sun.	244	Kidspost
Nation set record for heat last year	The Washington Post	1/9/13	Weds.	1229	A Section

Climate Experts Worry as 2006 Is Hottest Year on Record in U.S.	The Washington Post	1/10/07	Weds.	759	A Section
2012 warms its way into the record books	The Washington Post	12/28/12	Fri.	545	Metro
2010 ties '05 as warmest year on record	The Washington Post	1/13/11	Thurs.	589	A Section
Scientists See Weather Trend as Powerful Proof of Global Warming; Last Year's Average Worldwide Temperatures Climbed to the Highest Levels on Record	The Washington Post	1/9/98	Fri.	820	A Section
Washington Weathers Its Warmest Year	The Washington Post	1/1/91	Tues.	960	First Section
Global Temperatures Hit New High for 8th Straight Month	The Washington Post	9/11/98	Fri.	290	A section
Record Hot Readings in 1980s Boost Global-Warming Theory	The Washington Post	1/13/90	Sat.	701	First Section
More Rapid Warming May Follow Heat Of 1997-'98	The Washington Post	2/23/00	Weds.	660	A Section
Winter Warmth a Record; Nationally, It's the Balmiest on the Books, NOAA Says	The Washington Post	3/11/00	Sat.	583	A Section
1998 Is Warmest Year on Record; World Temperature Climbs 0.27 Degree, U.N. Agency Reports	The Washington Post	12/18/98	Fri.	539	A Section
1990 may be Warmest Year in Two Decades	The Washington Post	12/13/90	Thurs.	243	District Weekly

The world's never been hotter: So far, 2010 temps top the list	The Washington Post	8/14/10	Sat.	283	A Section
1988 Set Warmth Record, British Meteorologists Report; Scientists Differ on Signs of Long-Term Global Trend	The Washington Post	2/4/89	Sat.	741	First Section
2005 Continues the Warming Trend; Year's Temperatures Are Among the Highest on Record, Scientists Announce	The Washington Post	12/16/05	Fri.	604	A Section
HEATING UP	The Washington Post	5/25/97	Sun.	200	Outlook
A High and Dry Year; Once Again, D.C. Sets Temperature Record	The Washington Post	1/1/92	Weds.	936	First Section
Climatology: What's Hot, What's Not	The Washington Post	1/8/96	Mon.	296	A Section
Across Globe, Extremes of Heat and Rain; In Another Warm Year, a U.N. Agency Sees Unusual Weather and More to Come	The Washington Post	8/8/07	Weds.	843	Foreign
As another record falls, you're getting warmer	The Washington Post	10/22/14	Weds.	155	Style
Region's Warm, Dry Year Is One for the Books	The Washington Post	1/14/08	Mon.	219	Metro
Another hot month in a hot season	The Washington Post	9/5/12	Weds.	390	Metro
September extends warm trend	The Washington Post	10/3/12	Weds.	285	Metro

U.S. Had Unusually Warm Year, NOAA Says; Global Precipitation Is Above Average	The Washington Post	12/19/00	Tues.	405	A Section
Past Few Decades Warmest on Record, Study Confirms	The Washington Post	6/23/06	Fri.	622	A Section
For Those Who Sweat the Details: Summer Was 2nd Hottest	The Washington Post	9/23/91	Mon.	691	Metro
A Day Longer Than Usual, The Year Was Warmer, Too	The Washington Post	12/31/08	Weds.	360	Metro

Notes

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