Voices in the Storm: The Lost Discourse of Climate Change in Hurricanes Harvey and Irma

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Abstract: This study sought to answer the research question: How did media address climate change in reporting on Hurricanes Harvey and Irma? A content analysis was performed on the coverage of Hurricanes Harvey and Irma over a six-week timeframe by two national newspapers, The New York Times and the Los Angeles Times, and two local newspapers, the Houston Chronicle for Hurricane Harvey and the Tampa Bay Times for Hurricane Irma. A keyword analysis yielded 630 news articles (N=630), of which only 23 (3.65%) mentioned "climate change," "global warming," or both. Language that addressed these terms was coded on a Likert Scale (0-5, negative to positive), yielding a median score of 3.44, "slightly positive." An extensive literature review and discussion of the findings and implications for future research are included.

Keywords: Hurricane Harvey, Hurricane Irma, climate change, global warming, newspaper content analysis.

I. INTRODUCTION

I(a). The Storms: Hurricanes Harvey, Irma and Climate Change

August and September 2017 saw two Category 4 hurricanes make landfall in the continental United States. Hurricane Harvey made landfall on the south Texas Gulf Coast on August 25 [1], and Hurricane Irma made landfall in the Florida Keys on September 10 [2]. Both storms struck the U.S. with record intensity.

As noted by Klotzbach (2017) in compilations of data on Harvey and Irma, Harvey poured more than 51 inches of rain on Texas, the largest rainfall from a tropical cyclone in U.S. history [3a]. Hurricane Irma set several records for intensity, including: its 185 mph lifetime maximum winds made it the strongest Atlantic Ocean storm in history; it had the greatest Accumulated Cyclone Energy ("ACE") of a tropical Atlantic cyclone on record; and it was the first Category 4 hurricane to hit Florida since Hurricane Charley in 2004 [3b].

The public tends to view storms as isolated events, comparing them to other storms in recent memory. Climate scientists view them in a historic context that spans centuries, using geological records to site them on a continuum that spans hundreds of centuries. When viewed through those lenses, Hurricanes Harvey and Irma become figures in a tableaux with serious ramifications for the future of the continental United States.

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In the short view, a comprehensive report for the U.S. Global Climate Change Research Program, Karl *et al*. (2009) observe that, "The destructive power of Atlantic hurricanes have increased over the last the several decades; rainfall amounts in the heaviest downpours have increased by an average of 20 percent over the last century, and U.S. coastal sea levels have risen over the last 50 years, a trend which is forecast to continue" [4].

In the longer view, based on analysis of paleoclimatic data, there is evidence that the climatic changes currently being observed are indications of an "abrupt climate change scenario" that could last in the range of 100 to 1,000 years, the greater range of which last occurred more than 12,000 years ago [5].

In a meta-analysis of climate change data, the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce (2017) made the following predictions:

- Anthropogenic warming will increase the intensity of global tropical cyclones by 2-11%, and there are "better-than-even odds" that the increase will be "substantially larger than that in percentage terms";
- Anthropogenic warming and increased atmospheric moisture content will lead to "substantially higher average rainfall rates" in tropical cyclones;
- Sea level rise will lead to higher storm surge levels in tropical cyclones [6].

Data from a variety of studies support the predictions of storm intensity increasing as the century

unfolds. Elsner (2006) used Granger causality tests to find support for the hypothesis that the amount of energy stored in the ocean increases and turns to wind as climate change causes increases in atmospheric and ocean temperatures [7]. Knutson *et al*. (2010) argue that if there is no change in the behavior of tropical cyclones, their impact on coastal regions will likely increase as sea levels rise [8].

Mann & Emanuel (2006) connect the increase in hurricane activity in the Atlantic Ocean with the increase in water temperature in the tropical Atlantic [9]. Michener *et al*. (1997) take it further:

Global climate change is expected to affect temperature and precipitation patterns, oceanic and atmospheric circulation, rate of rising sea level, and the frequency, intensity, timing, and distribution of hurricanes and tropical storms [10].

Several studies advise caution of various sorts in reviewing data on the connection between climate change and hurricane activity. Trenberth (2005) notes that although anthropogenic environmental changes have become evident in hurricane regions, particularly in the rainfall amount and intensity of the storms, it is not yet clear that those changes will affect the number of hurricanes that occur [11]. Webster *et al*. (2005) argue that although "global data" reveal a 30-year trend of hurricanes that occur more frequently and with greater intensity, a "longer global data record" is required for a more complete understanding of the connection between climate change and hurricanes [12].

The cautions of researchers like Trenberth (2005) and Webster *et al*. (2005) concerning the connections between climate change and hurricanes are well taken, as they serve both as a call for more data and reminders of the need for care and precision in making long-term climate projections. But the preponderance of evidence supports the existence of a relationship between anthropogenic climate change and the increasing intensity of hurricanes, a relationship acknowledged by most climate researchers, even those who question the strength of that relationship. That raises the question: *Given the acknowledgement of the scientific community of the relationship between anthropogenic climate change and the increasing intensity of hurricanes, how do media address climate change when reporting on hurricanes?* Within that perspective, this study examines coverage of Hurricanes Harvey and Irma to answer the following Research Question:

RQ: How did media address climate change in reporting on Hurricanes Harvey and Irma?

I(b). Media Coverage of Climate Change

> "*The most dangerous myth that we have bought into as a society is not the myth that climate isn't changing or that humans aren't responsible, it's the myth that 'It doesn't matter to me.' And that's why this is absolutely the time to be talking about the way climate change amplifies or exacerbates these natural events. This brings it home*."
>
> - Catherine Hayhoe, Director, Climate Science Center, Texas Tech, speaking of Hurricanes Harvey and Irma, quoted on cnn.com on September 19, 2017 [13].

Brulle *et al*. (2012) take a communication theory approach to media coverage of climate change, citing quantity of coverage theory to argue that "media coverage of climate change directly affects the level of public concern," and referencing agenda setting theory in arguing that, "the importance the media assigns to coverage of climate change translates into the importance the public attaches to this issue" [14]. In a finding in a meta-analysis of global survey data on climate change conducted from an agenda-setting perspective, Bord, Fisher and O'Connor (1998) found that, "when global warming questions are included in lists of other environmental and social problems, global warming tends to reflect the least concern and support relative to the other issues" [15]. Stamm, Clark and Eblacas (2000) see global climate change as "an example of a mass communication problem that has yet to be adequately solved" [16]. Their data from a survey of metropolitan residents revealed an awareness of the issue in general terms, but a lack of understanding of its causes, consequences and potential solutions.

Journalistic norms can be sited along a continuum, ranging from the positive ideations of normative theory, as exemplified by the pursuit of objectivity in the tradition of the Enlightenment, to the negative ideations of norms, where the "episodic framing" of news stories leads to a lack of context (Boykoff, 2013 [17], following Iyengar, 1991 [18]). In a related study, Boykoff and Boykoff (2004), found in a content analysis of coverage from 1988 through 2004 of anthropogenic climate change that, "adherence to first-order journalistic norms

– personalization, dramatization, and novelty … led to informationally deficient mass-media coverage of this crucial issue" [19].

The negative valence of journalistic norms is further explored by Höijer (2010), noting that journalists "anchor and objectify the climate change issue within a mixture of emotions of fear, hope, guilt, compassion and nostalgia" [20]. Following Furedi (2006 [21]), Höijer argues that, "anchoring climate change in emotions of fear brings it into the expanding sphere of fear messages in the media" [20].

The identification of the role that journalistic values play in journalistic reporting on climate change is supported by Carvalho and Burgess (2005), who note in a study of climate change coverage in print media in the United Kingdom that, "values and ideological cultures are key to explain variations in the media's reinterpretations of scientific knowledge on climate change" [22].

Journalism is not performed in isolation. It cannot be separated from the culture in which it occurs, and its relationship to the many elements of that culture – social, economic, political – is dynamic. Boykoff and Boykoff (2007) emphasize the important role that media play in the battle to address climate change [23]. Following Bord *et al*. (2000 [24]), they argue that, "news media play a key role in shaping the variegated, politicized terrain where people may be galvanized into action, or mired in a swirl of contradictory phraseology, and resigned to passivity" [23].

Anderson (2009) notes the influence of "socio-political factors" on climate change reporting over time, with "political and industry interests" playing an increasingly larger role in the mix [25]. Weingart, Engels and Pansegrau (2000) offer a succinct description of this dynamic:

> Whatever the ecological risk of climate change may be, the communication about it differs among science, politics, and the media (i.e., the way the risk of climate change is perceived or, as some would have it, socially constructed and communicated differs among the three sectors of society). The differences between these three sectors are not random but systematic, given the specific risks each of them faces [26].

Following a similar thread of inquiry, Trumbo (1996) found that the forces of science and politics exert comparable influence on media coverage at the outset of a particular climate change issue, but as the issue "matures," news coverage tends to shift away from an examination of causes (science) and more toward an examination of solutions grounded in the world of politics [27].

In a content analysis of reporting on global warming, McComas and Shanahan (1999) note that coverage is cyclical, running through three phases, with each having a different emphasis: "implied danger and consequences" in the first "upswing" phase, "controversy among scientists" in the second "maintenance" phase, and the "economics of dealing with global warming" in the "maintenance and downside of the attention cycle" [28].

II. METHODS

Two national publications were selected for their coverage on both storms (Hurricane Harvey and Hurricane Irma) – the Los Angeles Times and The New York Times. Two "local" publications were chosen for each storm: The Houston Chronicle for Hurricane Harvey and the Tampa Bay Times for Hurricane Irma. The Tampa Bay Times was selected because Tampa Bay was forecast to receive the brunt of Hurricane Irma up until the day before it made landfall (Reeves & Lush, 2017, Sept. 9 [29]). The Houston Chronicle was chosen for Hurricane Harvey as it is the largest daily newspaper in Houston and the city was expected to be directly in the hurricane's path. The timeframe of August 10 through September 22 was selected, as it allowed for coverage for days leading up to both storms as well as days after.

Database searches were conducted on all four newspapers. The databases included Nexis Uni (Tampa Bay Times and Los Angeles Times), LexisNexis Academic (The New York Times), and NewsBank (Houston Chronicle). The following search terms were used: Hurricane, Hurricane Harvey, Hurricane Irma, Tropical Storm, Tropical Storm Harvey, and Tropical Storm Irma. The search engines produced the data displayed in Table **1** (below).

Following Liu, Vedlitz and Alston (2008) [30], Ahchong and Dodds (2012) [31], and Takahashi and Meisner (2013) [32], the list of articles generated from each search engine was then narrowed down to create a data set consisting only of news stories about the storms from each newspaper. This process was similar to that employed by Liu *et al*. (2008), as described in

Table 1: Search Term Results

Search Terms	Tampa Bay Times	Los Angeles Times	The New York Times	The Houston Chronicle
Hurricane	545	258	511	1,696
Tropical Storm	42	71	191	478
Hurricane Irma	436	105	177	N/A
Tropical Storm Irma	27	10	1	N/A
Hurricane Harvey	N/A	150	282	1,587
Tropical Storm Harvey	N/A	60	24	464

their note, “Editorial, comment and opinion pieces, along with letters to the editor from readers were also discounted as their views may reflect those of a particular individual or organization” [30]. The following selection criteria were applied: 1) the story has a byline, and 2) the subject of the story is the storm. This process resulted in the exclusion of stories in the following categories: sports, features, editorials, opinion, columns, and public service articles. This method of selection yielded 630 news stories about the two hurricanes (N = 630), as shown in Table **2** (below).

This selection was further refined by searching for the terms "climate change" and "global warming," yielding a total of 23 stories (*n* = 23) that mention “climate change” only, “global warming” only, or both terms together (in the same story), as shown in Tables **3** and **4** (below).

The articles were then analyzed to determine the valence of the language used to describe climate change and/or global warming, and measured on a Likert scale (0 = negative, 3 = neutral, 5 = positive), with findings reported in the Results section below. In an effort to improve intercoder reliability, the coding of the final data set was conducted in a group by the three authors. Each author coded every article individually, and the average of the three scores was reported for each.

Table 2: News Stories by Subject

Story Subjects	Tampa Bay Times	Los Angeles Times	The New York Times	The Houston Chronicle
Harvey	N/A	54	257	26
Irma	102	38	153	N/A
Both Storms	N/A	92	410	N/A

Table 3: Mentions of Climate Change and Global Warming in Articles about Hurricane Irma

Mentions	Tampa Bay Times	Los Angeles Times	The New York Times
Climate Change	3	3	4
Global Warming	0	1	0
Both Terms	1	0	6

Table 4: Mentions of Climate Change and Global Warming in Articles about Hurricane Harvey

Mentions	The Houston Chronicle	Los Angeles Times	The New York Times
Climate Change	0	2	2
Global Warming	0	0	0
Both Terms	0	0	3

Table 5: Average Valences of Climate Change Language

Story Subjects	Tampa Bay Times	Los Angeles Times	The New York Times	The Houston Chronicle
Harvey	N/A	3.33 (n=2)	3.67 (n=5)	N/A (n=0)
Irma	3.02 (n=4)	3.67 (n=2)	3.87 (n=10)	N/A (n=0)

III. RESULTS

Average valences of the language used to describe climate change and/or global warming, recorded on a 5-point Likert Scale (0 = negative, 3 = neutral, 5 = positive), are seen in Table **5** (above).

The median value is 3.44. The valences all occurred just above the neutral mark (3.0) with only 0.85 separating highest and lowest marks, and are therefore characterized as "slightly positive."

IV. DISCUSSION

The most striking element of this study for the researchers is the paucity of mentions of climate change and/or global warming in newspaper coverage of two of the most powerful tropical storms ever to hit the U.S. mainland. Six weeks of coverage of these two storms in four newspapers, two national and two local to the storms, produced a total of 630 news stories, of which only 23 (3.65%) mention the science most connected to their intensity, if not necessarily to their cause. The fact that no mention of climate change or global warming was made in the Houston Chronicle in six weeks of coverage before, during and after Hurricane Harvey, despite the city being the target of the storm, is revelatory of the communication distance that must be bridged before this issue can be effectively addressed.

What are we to make of the quiescence of climate change in reporting on climatic events? Certainly, the cautions of Anderson (2009) ring true, that "media reporting of climate change is heavily influenced by socio-political factors over time, and has become increasingly affected by political and industry interests" [25]. Though outside the scope of this study, politicians quoted in the news stories in this dataset said that they avoided the phrases "climate change" and "global warming" when discussing the storms because those phrases had been "politicized." Could the same be said of the reporters who wrote the stories?

The few references to climate change and global warming in these stories are unlikely to spur discussion of their effect on future storms, let alone calls for societal change and political action to limit their effects. If Brulle *et al*. (2012) are correct in their assertion that, "the greater the quantity of media coverage of climate change, the greater the level of public concern" [14], then the obverse is most likely is true as well. If public attention to climate change is cyclical, as McComas & Shanahan (1999 [28]) and Ford & King (2015 [33]) argue, increased attention to the phases of these cycles may reveal more opportunities for effective risk communication.

As Shackley and Wynne (1996) note, reporting uncertainty in science research is a challenge to reporters [34]. As Stocking and Holstein (1993) observe, that uncertainty has become an effective tool in the hands of climate-change skeptics and deniers, who use it to sow doubt in the public mind about the validity and reliability of climate science [35].

Framing theory also illuminates the inquiry into media coverage of climate change. Climate change is frequently framed as an international or global issue (Liu *et al*., 2008 [30]; Olausson, 2009 [36]; Gordon *et al*., 2010 [37]). Belying its local impact effectively negates its importance as a local issue. However, Scholte *et al*. (2013) argue that the emergence in the media of a diversity of frames to describe global warming offers new avenues to effectively communicate this phenomenon and aid the audience in understanding it [38].

V. LIMITATIONS, FUTURE RESEARCH

It was the original intention of the authors in designing this study to perform a quantitative analysis of the data that emerged from the search engine results, but the final data set was so small that such an analysis was not warranted. Although coding on a Likert Scale of the 23 news stories in the final data set that mentioned climate change and/or global warming was performed individually, it was not done in isolation, and discussion of the values assigned by other coders may have affected individual coding.

In this study of media coverage of two of the most powerful storms ever to strike the continental United

States, the silence of the voice of climate change is deafening. The *strength* of the connection between climate change and the intensity of tropical storms can be, and should be, debated. It is a matter of science. But the *existence* of that connection should not be the subject of debate, at least of any informed debate. The scarcity of coverage of climate change in major media outlets evidenced in this study should be of great concern. It will take strong public support to generate the political will to mount an effective fight against global warming and climate change. Absent that political will, it is difficult to envision the enactment of measures of a strength and scope equal to the challenge that climate change presents not only to our nation, but to our world.

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