



A National Survey of Television Meteorologists About Climate Change Education

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Investigators:

George Mason University: Edward Maibach, Sara Cobb, Erin Peters, Carole Mandryk, David Straus, Dann Sklarew, Jim Witte, Lee Clarke & Jagadish Thaker.

American Meteorological Society: Keith Seitter

National Weather Association: Steve Harned

American Association of State Climatologists: Dennis Today

American Geophysical Union: Eugene Bierly

National Oceanic and Atmospheric Administration: Martin Hoerling, David Herring

Yale University: Anthony Leiserowitz

Cornell University: Rick Bonney

Climate Central: Heidi Cullen

National Center for Atmospheric Research: Vanessa Schweizer

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Summary of Research Aims, Methods and Key Findings

A grant titled “Making the Global Local: Unusual weather events as climate change education opportunities” – one of 15 climate change education initiatives funded by the NSF Climate Change Education Partnership (CCEP) program – was awarded to George Mason University and partners to support broadcast meteorologists (hereafter referred to as “weathercasters”) in their efforts to better communicate with the public on issues related to the changing climate. Among the most trusted and familiar sources of informal science education for most Americans (Leiserowitz et al, 2011), weathercasters are optimally positioned to help enhance public understanding of climate change, including how it is influencing local and regional weather patterns across the United States.

To supplement the findings from a national survey of weathercasters conducted in January 2010 (Maibach et al, 2010), in January and February 2011 a second survey was conducted.

Aims of the 2011 survey included:

- (1) To more deeply explore the specific resources needed, and barriers faced, by weathercasters who are motivated to communicate with the public on issues related to climate change, both on and off the air;
- (2) To better understand the views of weathercasters who are undecided or unconvinced about whether global climate change is currently happening and/or whether human activities are a significant contributor to the observed warming; and
- (3) To identify climate change education resources that would be helpful to any or all of these groups of weathercasters.

Methods

All broadcast TV members of the American Meteorological Society (AMS) and the National Weather Association (NWA) were surveyed using a web-based method and member email lists provided by the two professional associations.

Of the 1405 names and email addresses provided by AMS and NWA, 84 people were ineligible because we determined that they no longer worked as TV meteorologists or their email addresses proved to be incorrect. Therefore, the valid initial denominator of our sample was 1321. Seventy-two of these people refused to participate, 819 did not respond, and 430 completed at least some portion of the survey, yielding a minimum response rate of 32.6% (which assumes that all non-respondents were eligible to participate).

Using American Association of Public Opinion Research’s (2008) formula for estimating eligibility rate (e) among non-respondents [$\text{Refusals} / (\text{Refusals} + \text{Known Ineligibles})$], we estimated the non-respondent eligibility rate at .462 %. Applying AAPOR’s adjustment for estimated eligibility among non-respondents [$(\text{Completed and Partial Interviews}) / (\text{Completed and Partial Interview} + (\text{Refusals}) + e(\text{Unknown Eligibility}))$] yielded an adjusted response rate of 48.9%.

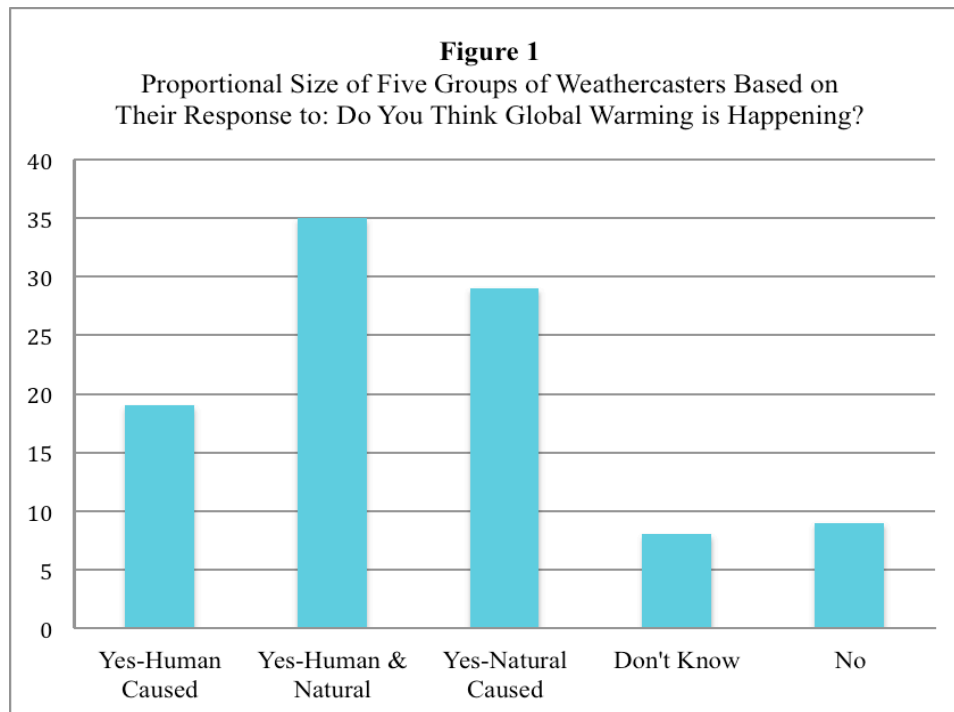
Key Findings

Regarding climate change, there are five potentially distinct groups of weathercasters

Our 2010 survey indicated that 54% of weathercasters nationwide were convinced that the climate is changing, 25% were unconvinced, and 20% were undecided. The findings from the current survey yielded a more nuanced picture. There appear to be five potentially distinct groups of weathercasters (Figure 1): three groups convinced that the climate is changing, but with different views as to why –



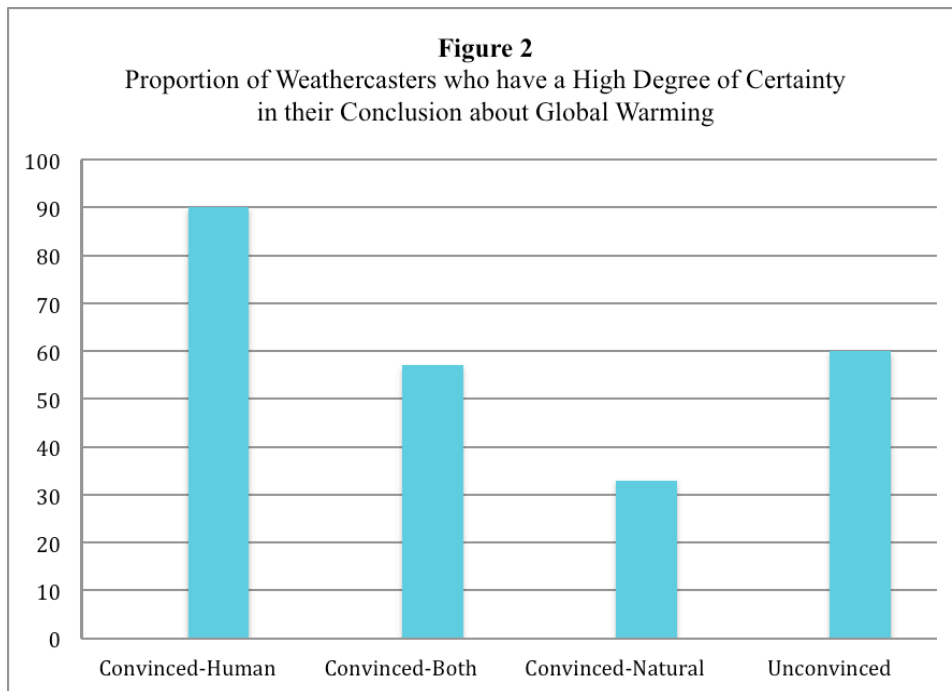
mostly human causes (19%), mostly natural causes (29%), and human and natural causes in more-or-less equal proportion (34%) – as well as two distinctly smaller groups: those who are unconvinced (9%), or undecided (8%).



These findings advance our understanding of the weathercaster community in several important ways. We now understand that: (1) Like the great majority of climate scientists, a large majority (82%) of weathercasters are convinced that the climate is changing. (2) Unlike the great majority of climate scientists (Doran & Zimmerman, 2009), the two largest groups of weathercasters have concluded that human activity is not the primary cause of climate change over the past 150 years. (3) Only a small group of weathercasters (9%) have concluded that the climate is not changing. (4) Another small group of weathercasters (8%) have not yet become convinced one way or the other, for the most part because they feel the evidence is insufficient to prove either position or to attribute the relative contribution of human versus natural factors.

The weathercasters at the two ends of the spectrum are the most likely to be certain of their position.

The different groups of weathercasters express varying degrees of certainty regarding their conclusions about global warming (Figure 2). Note: Undecided weathercasters were not asked this question.



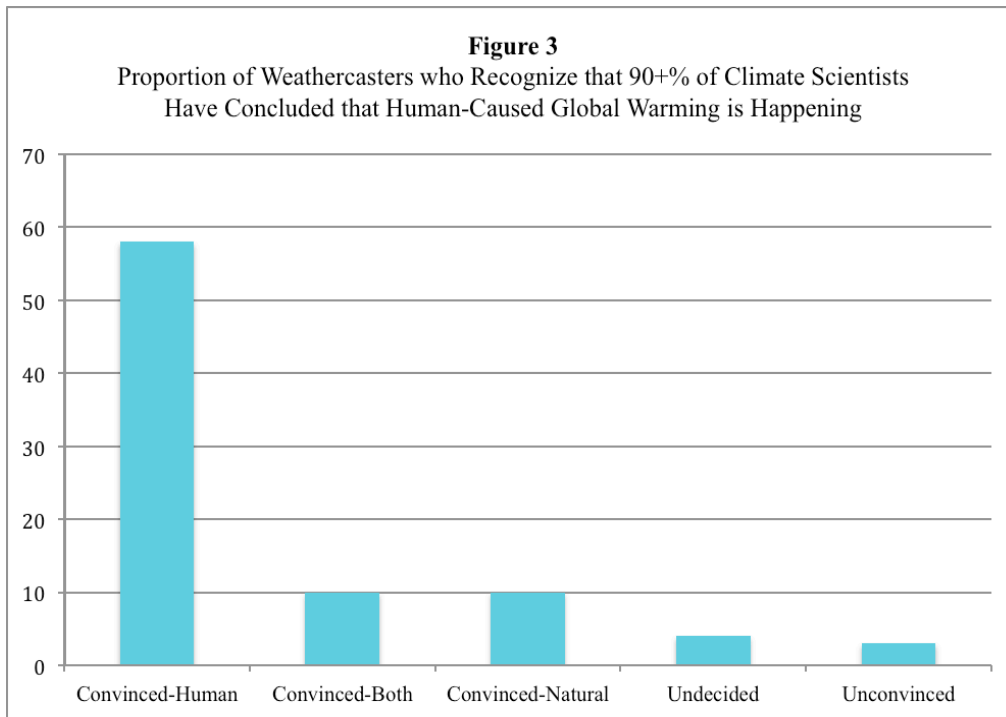
Nearly all (90%) weathercasters who think global warming is happening primarily as a result of human activities (hereafter referred to as “*Convinced-Human*”) said they were either “very” or “extremely” sure that global warming is happening. Those weathercasters who do not think global warming is happening (hereafter referred to as “*Unconvinced*”) were the next most certain group, with 61% that said they were “very” or “extremely” sure that global warming was NOT happening. For those who have concluded that global warming is due to both human and natural causes (hereafter referred to as “*Convinced-Both*”), 57% were “very” or “extremely” sure of their position. And of those who said that global warming is happening but is due primarily to natural causes (hereafter referred to as “*Convinced-Natural*”), only one-third reported being “very” or “extremely” sure of their position.

Only a minority of weathercasters indicated that they are satisfied with the continuing education opportunities on climate change currently available to them.

Overall, only 10% of weathercasters indicated that they are very satisfied with the continuing education (CE) opportunities available to them, while an additional 25% responded that they are somewhat satisfied. The segment of weathercasters most satisfied with available climate change CE opportunities are the *Convinced-Human* group, but even so, only a minority of that segment are satisfied with available offerings. Only 42% of weathercasters have participated in continuing education courses (or other organized learning experiences) on climate change. Members of the *Convinced-Human* segment (53%) were most likely to have taken CE courses. These findings suggest a need to improve the CE offerings on climate change and/or to improve the marketing of the offerings that are currently available.

Only a small minority (18%) of weathercasters recognizes that there is widespread agreement among the world’s climate scientists that human-caused global warming is occurring.

Confirming and clarifying the results of our 2010 survey, it is now clear that most weathercasters significantly underestimate the degree of consensus about anthropogenic climate change among climate scientists. Even among the *Convinced-Human* segment, less than two-thirds (58%) correctly understands that over 90% of climate scientists are convinced global warming is happening (Figure 3); 10% or less of the other four segments believe that is the case.



Fewer than half of weathercasters are familiar with citizen science projects taking place in their community, but those weathercasters who are most familiar with local projects are highly likely to have referred their viewers to the projects.

Less than half (46%) of all weathercasters are “somewhat” to “very” familiar with citizen science projects in their community, and just over one-third (36%) have referred viewers to them. However, more than two-thirds (68%) of all weathercasters are “moderately” to “very” interested in learning more about citizen science projects in their community, and a large majority (84%) indicate they would be “moderately” to “very” likely to refer interested viewers to projects that impressed them. They report being most likely to refer viewers to citizen science projects focused on precipitation and weather patterns (50%), and less likely to refer viewers to projects studying plants (20%) birds or other wildlife (17%), or animal migrations (14%).

Nearly three-quarters of weathercasters who reported being “very familiar” with the citizen science programs in their community had referred viewers to such programs on five or more occasions. Only 28% of those weathercasters who indicated being “somewhat familiar” and none of the weathercasters who indicated being “aware, but not really familiar” with local citizen science programs referred their viewers to such programs on five or more occasions.

Approximately half of all weathercasters are interested in reporting about climate change on-air (44%) and off-air (57%). Not surprisingly, member of the *Convinced-Human* segment are the segment most likely to be interested in both on-air (73%) and off-air (84%) reporting about climate change.

Interest in on-air reporting about climate change varies significantly between the different segments. While nearly three quarters (73%) of *Convinced-Human* weathercasters are interested in reporting on climate change on-air, and nearly half of the *Convinced-Both* segment, only one third or fewer of the *Convinced-Natural*, *Undecided*, and *Unconvinced* express such interest. This picture is reinforced by weathercasters’ self-reported climate change reporting patterns: 69% of the *Convinced-Human* segment

and 64% of the *Convinced-Both* segment indicated that they cover the issue at least once per year on-air, while levels of coverage were lower among the *Convinced-Natural* (45%), the *Undecided* (34%) and the *Unconvinced* (42%) segments.

A large majority (84%) of the *Convinced-Human* group also expresses interest in educating the public about climate change outside of their on-air broadcasts, while only about half of the *Convinced-Both* and *Convinced-Natural* groups, and just over a third of the *Undecided* and *Unconvinced* groups do so. Among those who expressed an interest in off-air opportunities, a large majority (90%) of all weathercasters prefer community, civic, and school presentations, while about two-thirds expressed interested in using their stations web site and blog for engaging with the public on climate change, and just under half were interested in using radio and newspaper columns for this purpose.

Weathercasters educate the public about climate change off-air more frequently than they do on-air, with over three-quarters doing so at least once a year. As is the case with their on-air reporting, frequency varies between groups, with members of the *Convinced-Human* (81%) and *Convinced-Both* (82%) segments most likely to educate the public once per year or more frequently.

It is important to note that more than half (56%) of the *Convinced-Human* segment, nearly one third (30%) of the *Convinced-Both* segment, and approximately one fifth (21%) of the *Convinced-Natural* segment would like to report on climate change more frequently in the future. Conversely, almost none of the *Undecided* and *Unconvinced* are interested in increasing their rate of reporting.

Finally, a majority (60%) of all weathercasters indicate that their audiences are “moderately” to “very” interested in learning about natural phenomena that influence the weather. Members of the *Yes-Human* (70%) and the *Convinced-Both* (68%) segments perceive above average viewer interest in learning about such phenomena.

Among *Convinced* weathercasters, lack of time is the main impediment to reporting on climate change.

Across all three *Convinced* segments of the weathercaster community, lack of time in the newscast (87%) and lack of time of time for field reporting (81%) were the leading (“moderate” and “large”) obstacles to reporting on climate change. In addition, many respondents also identified scientific uncertainty about climate change (48%), lack of access to appropriate visuals/graphics (46%), lack of news management support (42%), lack of viewer support (39%), and lack of general management or owner support (36%) as obstacles.

Members of the *Convinced-Natural* (64%) and the *Convinced-Both* (54%) segments were far more likely than members of the *Convinced-Human* (13%) segment to identify scientific uncertainty about climate science as an obstacle to their reporting on climate change.

***Convinced* weathercasters identified a wide range of resources that could improve their ability to report on climate change.**

Over two-thirds of all *Convinced* weathercasters felt that the following resources would be “moderately” or “very” helpful: high quality graphics/animations (81%), public education materials (81%), a list of credible online resources (80%), online professional development materials for weathercasters (79%), specific regional climate projections (79%), high quality online content (76%), access to the state climatologist (74%), answers to frequently asked questions by the public (73%), access to local climate scientists for on-camera interviews (72%) and to rapidly answer questions (78%), PowerPoint presentations for public speaking events (71%), and examples of other weathercasters who have successfully included climate change in their broadcasts and public speaking (71%). Members of the *Convinced-Human* segment were the most likely to say all of these resources would be helpful, while members of the *Convinced-Natural* segment were the least likely to say they would be helpful.



***Convinced* weathercasters are interested in reporting on a wide range of local climate change stories.**

Over two-thirds of all *Convinced* weathercasters are “moderately” or “very” interested in reporting local information about the following types of events: new records such as the hottest day (79%), changes in rainfall (79%), changes in flooding (78%), changes in droughts (75%), changes in extreme heat events (73%), impacts on the local economy (72%), impacts on agriculture (72%), impacts on seasonal events such as first frosts (72%), connections between global climate change and local impacts (71%), impacts on human health (67%), and changes in snowstorms (67%). Again, there is a clear pattern in these data such that members of the *Convinced-Human* segment are most interested in reporting on all of these stories, and members of the *Convinced-Natural* segment are least interested.

Various types of information have helped *Convinced* weathercasters conclude that global warming is occurring.

A large majority (80%) of *Convinced* weathercasters said that it was their own professional judgment that convinced them that global warming is occurring – the single most cited factor. Directly observed indicators of climate collected over the past century (74%), and indirect indicators of climate over the past 1,000 or so years such as tree ring data (69%) were also cited as convincing evidence by large numbers of *Convinced* weathercasters, as was the professional judgment of experts (65%). Nearly half (48%) report that their own direct personal experiences helped convince them. Computer models were the least convincing form of evidence, cited by only 38% of *Convinced* weathercasters.

Members of the *Convinced-Natural* segment were dramatically less likely to be convinced by any of these sources of evidence, especially the professional judgment of experts (35%) and computer models (11%).

For many *Convinced* weathercasters, climate change is a here and now problem: Half indicate that their community has already experienced the impact of climate change.

Overall, about half (51%) of *Convinced* weathercasters have concluded that their community has already experienced climate change in the past 20 years. A large majority (81%) of the *Convinced-Human* segment, and over half (53%) of the *Convinced-Both* segment have reached this conclusion, but only a minority (27%) of the *Convinced-Natural* segment has. A larger proportion (62%) of *Convinced* weathercasters believe that their community will experience climate change in the next 20 years. This is especially true of members of the *Convinced-Human* (91%) and *Convinced-Both* (67%) segments. A substantial minority (44%) of *Convinced* weathercasters – particularly members of the *Convinced-Human* segment (68%) – said that they have personally observed the impacts of climate change.

Among the small segment of *Undecided* weathercasters, a very large majority shows interest in learning more about a range of climate change topics.

Overwhelming majorities (85-95%) of *Undecided* weathercasters are “somewhat” to “very” interested in learning more about such topics as the similarities and differences between weather and climate models, why scientists believe that climate models can make reasonably accurate projections of the future climate when weather models break down after several days, the ability of climate models to “reproduce” past climate events, the reliability of “proxy” data to describe past changes in the climate, how climate models determine how much of recent climate changes is due to human causes, and how past climate changes are different than those projected for the next 100 years.

***Unconvinced and Undecided* weathercasters, as well as members of the *Convinced-Natural* segment, overwhelmingly reject climate models as a valuable source of information about climate change.**

Only 11% of members of the *Convinced-Human* segment said that projections from global computer models helped to convince them that the climate is changing. Among *Undecided* and *Unconvinced* weathercasters, 80% and 87%, respectively, distrust computer models of climate change. Similarly, 76% and 77% of the members of these two segments, respectively, distrust the ability of computer models to determine how much of recent climate change is due to natural versus human causes. The vast majority of *Unconvinced* weathercasters have concluded that global models that project future climate change are based on inadequate and incomplete data (87%), are based on flawed assumptions (81%), and that land-use changes and other non-CO2 variables have not been adequately considered (73%).

***Undecided and Unconvinced* weathercasters are more likely to trust climate data itself, and less likely to trust what climate scientists do with the data – including how the data is handled, analyzed, and used in models.**

Undecided and *Unconvinced* weathercasters reported largely similar levels of trust (or distrust) in the various types of data – and methods – used in climate science. They diverged, however on their trust in the motivations of climate scientists: *Unconvinced* weathercasters report lower levels of trust in the motivations of climate scientists than do *Undecided* weathercasters (10% vs. 28%).

Approximately two-thirds (62-71%) of all *Undecided* and *Unconvinced* weathercasters “strongly” or “somewhat” trust the validity of temperature records from the last 150 years and the validity of indirect or “proxy” data (like ice cores and tree rings) used to describe the climate in the past. Approximately half (48-55%) trust the reliability of proxy data and its relevance for understanding current and future climate conditions. Somewhat fewer (41-43%) trust the analytic techniques used by climate scientists. Fewer still trust computer models ability to replicate past climate (29-31%), the ways in which climate scientists handle inconsistencies in data sources (21-29%), models ability to measure how much of recent climate change is due to natural versus human causes (23-24%), and computer models of climate change (14 to 20%).

***Unconvinced* Weathercasters unanimously assert that the climate always changes; any current changes are part of natural climate variability.**

The one factor universally cited (100%) by *Unconvinced* weathercasters as convincing them that global warming is not happening is that the climate always changes. As stated above, they report serious doubts about the use of climate models and the data that is used in them. About two-thirds (65-70%) say that global warming is not happening due to their own evaluation of the data, as well as the judgment of experts they trust. Regarding data specifically, close to two-thirds (61%) say that directly observed indicators collected over the last century (such as temperature) have contributed to their belief that human-induced climate change is not happening. More than a third (40%) cite indirect indicators of climate – such tree rings and ice core samples – as contributing to their decision that the climate is not changing.

A large majority of *Unconvinced* weathercasters – and a significant minority of *Undecided* weathercasters – have concluded that claims of human-caused climate change are a politically motivated conspiracy. A majority of both groups have concluded that climate scientists are dishonest. Most in both groups also believe that the uncertainties are too great at present to justify any action other than further research.

Fully 70% of *Unconvinced* weathercasters and 41% of *Undecided* weathercasters said that claims of human-caused climate change are a cover for a political agenda to increase government control of society. A majority of both groups said that climate scientists are claiming that climate change is happening and

human caused as a means to ensure that they continue to receive research grants (64% and 59%, respectively), by changing their results (81% and 59%), conspiring to suppress results they disagree with (74% and 73%), and treating anyone who disagrees with them as ignorant (85% and 62%, respectively).

Three quarters (78%) of the *Unconvinced*, and two-thirds of the *Undecided* (65%) said that the uncertainties inherent in the claims of human-caused climate change mean that it would be foolish to take dramatic actions now; more study is needed.

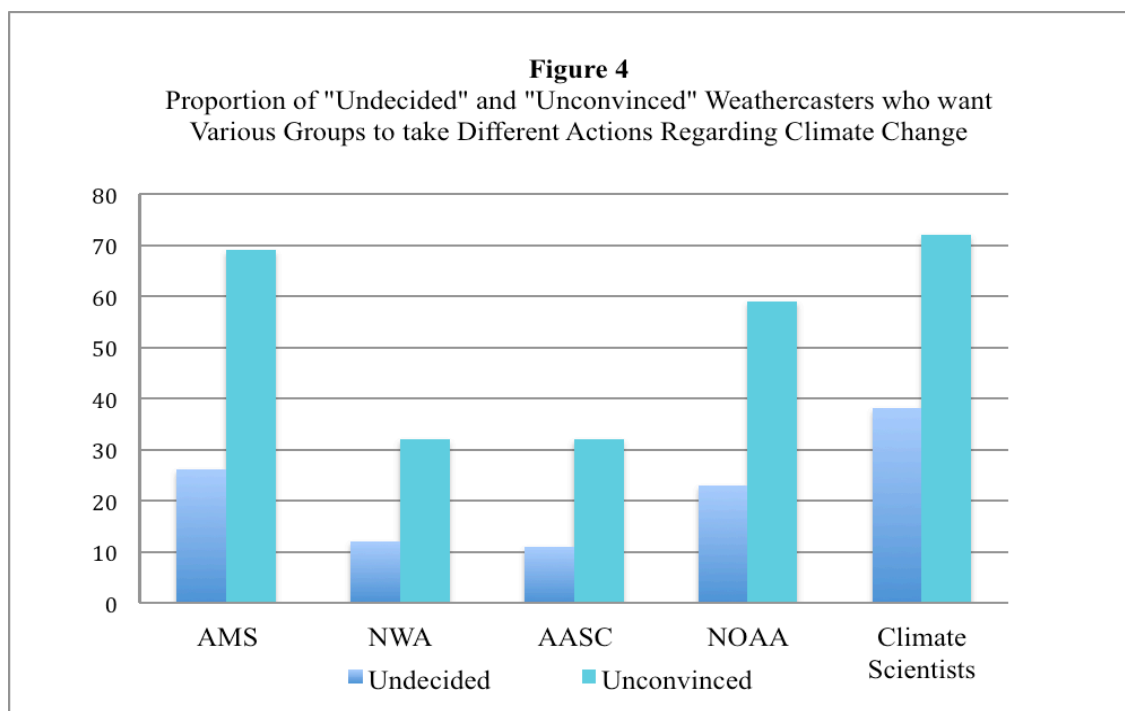
Members of the *Unconvinced* and *Undecided* segments differ, however, on other potentially important beliefs about the climate and climate science.

Whereas a large majority (83%) of the *Unconvinced* disbelieves the claims of human-caused climate change because the climate system is vast, chaotic and past changes in the climate were naturally induced, only slightly more than a third (38%) of the *Undecided* feel this way. Moreover, while nearly three-quarters (72%) of the *Unconvinced* say that the scientific evidence used to support claims of human-caused climate change will eventually be shown to be incorrect, only slightly more than one quarter (28%) of the *Undecided* say this. And lastly, while 70% of the *Unconvinced* believe that climate models and hypotheses are “junk science” that cannot be verified, only 28% of the *Undecided* hold this view.

However, nearly all members of the *Unconvinced* and *Undecided* segments agree that some of the proposed “solutions” to climate change make sense for America.

An overwhelming majority of both groups (91% and 100%, respectively) agreed that becoming more energy efficient and developing clean renewable energy sources makes sense for America, whether the climate is warming or not.

***Unconvinced* weathercasters are far more likely than *Undecided* weathercasters to say that they want professional organizations (AMS & NWA), NOAA, state climatologists, and especially climate scientists themselves to do things differently going forward (Figure 4).**



Unconvinced and *Undecided* weathercasters are particularly likely to want different actions from AMS (69% and 26%, respectively) and from climate scientists (72% and 38%, respectively). A sizable portion of both segments (50% and 23%, respectively) also would like to see changes from NOAA. The open-ended comments offered in response to these questions indicate that what they would like to see from AMS and NOAA is more neutrality, and from climate scientists, more transparency.

Overall, weathercasters tend to be relatively young, recently educated, and male.

More than half (51%) of all weathercasters graduated in the last ten years, and nearly 70% in the last 15 years; fewer than 10% were educated over 30 years ago. Nearly half (43%) are 39 years old or younger. Men make up the overwhelming majority (82%) of weathercasters.

Lastly, a majority of all *Convinced* weathercasters – and a minority of *Undecided* and *Unconvinced* weathercasters – reported interest in assisting the CCEP project going forward.

Two-thirds of all *Convinced* weathercasters surveyed were willing to review educational resources, take part in telephone focus groups, or participate in workshops. Variation in positive response rates between different groups of the weathercaster community ranged from a high of 82% for the *Convinced-Human* group; to a low of 24% for the *Undecided* group.

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Part I. Questions Asked of all Respondents

1. Global warming refers to the idea that the world’s average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world’s climate may change as a result.

1a. What do you think? Do you think that global warming is happening?

Yes, and it is caused mostly by human activity	19%
Yes, it is caused more-or-less equally by human activity and natural events	35%
Yes, and it is caused mostly by natural events	29%
Don’t know*	8%
No	9%
<i>n=433. * Three respondents skipped this question and were treated as having answered "Don't know."</i>	

1b. [If Q1 is Don't know] Which of the following statements best describes why you are undecided about whether or not global warming is happening?

I haven’t had adequate opportunity to study the facts.	3%
I’m just not interested in the topic.	0%
I have concluded there is equal evidence on both sides of the argument	6%
I have concluded that currently there is insufficient evidence to prove either position.	44%
I have concluded that currently there is insufficient evidence to attribute the relative contributions of human vs. natural factors.	38%
Other (see Appendix for detailed responses)	9%
<i>n=32</i>	100%



2. How sure are you that global warming is/isn't happening?

	Convinced that global warming is happening				
	Total	Yes			No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes	
Not at all sure	7%	0%	7%	13%	3%
Somewhat sure	36%	10%	36%	53%	37%
Very sure	40%	48%	44%	27%	45%
Extremely sure	17%	42%	13%	6%	16%
<i>n=399</i>	100%	100%	100%	100%	100%

3. Which term do you prefer to use with members of the public?

	Convinced that global warming is happening					
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Global warming	24%	26%	24%	23%	18%	29%
Climate change	57%	54%	55%	61%	75%	40%
Global climate change	14%	18%	20%	9%	4%	14%
Other	5%	3%	2%	7%	4%	17%
<i>n=414</i>	100%	100%	100%	100%	100%	100%



4. Which term do you prefer to use with other meteorologists?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Global warming	26%	28%	20%	27%	21%	42%
Climate change	57%	51%	61%	60%	71%	31%
Global climate change	13%	19%	17%	9%	4%	6%
Other	4%	2%	1%	4%	4%	22%
<i>n=414</i>	100%	100%	100%	100%	100%	100%

5. How satisfied are you with the continuing education opportunities on climate change that are available to you through AMS, NWA and other sources?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very satisfied	10%	18%	9%	8%	0%	8%
Somewhat satisfied	25%	25%	35%	20%	7%	16%
Neutral	36%	28%	32%	42%	55%	37%
Somewhat dissatisfied	10%	11%	10%	9%	10%	11%
Very dissatisfied	3%	1%	0%	5%	7%	13%
I am unaware of the available CE opportunities on climate change	16%	18%	13%	17%	21%	16%
<i>n=421</i>	100%	100%	100%	100%	100%	100%

6. On the whole, how interested would you say your audience is in learning about natural phenomena that influences the weather (e.g., the jet stream, El Nino)?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very interested	21%	26%	21%	18%	7%	26%
Moderately interested	39%	44%	47%	31%	31%	32%
A little bit interested	36%	27%	30%	46%	55%	37%
Not at all interested	4%	2%	2%	5%	7%	5%
<i>n=422</i>	100%	100%	100%	100%	100%	100%

7. “Citizen science” projects – such as the Audubon Society’s Christmas Bird Count, Cornell University’s Project FeederWatch, and the Colorado Climate Center’s Community Collaborative Rain, Hail & Snow Network (CoCoRaHS) – are scientific research projects that involve citizen volunteers in the collection of data. How familiar are you with “citizen science” projects that are taking place in your community?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very familiar	15%	16%	14%	12%	21%	19%
Somewhat familiar	31%	31%	34%	28%	24%	33%
Aware, but not really familiar	28%	31%	30%	25%	28%	22%
Not at all aware	26%	22%	22%	35%	28%	25%
<i>n=418</i>	100%	100%	100%	100%	100%	100%

8. Have you ever referred viewers or others to a citizen science project in your community?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
No	65%	60%	63%	65%	66%	75%
Yes, once or twice	28%	26%	28%	31%	28%	19%
Yes, three or four times	0%	0%	0%	0%	0%	0%
Yes, five or more times	8%	14%	9%	3%	7%	6%
<i>n=417</i>	100%	100%	100%	100%	100%	100%

9. How interested would you be in learning more about high quality citizen science projects taking place in your community?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very interested	34%	48%	35%	23%	31%	33%
Moderately interested	34%	31%	39%	34%	28%	28%
A little bit interested	26%	17%	22%	33%	31%	31%
Not at all interested	6%	4%	3%	10%	10%	8%
<i>n=417</i>	100%	100%	100%	100%	100%	100%

10. If the citizen science projects in your community impressed you, how likely would you be to refer potentially interested viewers to participate in these projects?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very likely	43%	63%	46%	33%	31%	31%
Moderately likely	41%	30%	42%	44%	52%	47%
Moderately unlikely	5%	2%	4%	7%	7%	3%
Very unlikely	6%	4%	3%	8%	0%	14%
Don't know	6%	1%	5%	8%	10%	6%
<i>n=417</i>	100%	100%	100%	100%	100%	100%

11. [If Q10 is Very or Moderately likely] What types of citizen science projects would you be most likely to refer viewers to?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Projects that study birds or other wildlife.	17%	18%	15%	19%	14%	13%
Projects on precipitation and weather patterns.	50%	45%	48%	56%	52%	53%
Projects that study timing of leafing, fruiting, or flowering of plants.	20%	22%	22%	15%	20%	18%
Projects that study timing of animal migrations.	14%	15%	15%	10%	14%	16%
<i>n=351</i>	100%	100%	100%	100%	100%	100%

12. When you meet students who are interested in becoming a broadcast meteorologist, what are the top two or three schools that you recommend to them?

Top 10	Total	1 st Choice	2 nd Choice	3 rd Choice
Penn State	19%	22%	23%	11%
University of Oklahoma	13%	13%	13%	11%
Mississippi State	12%	12%	11%	11%
University of Wisconsin	7%	7%	5%	10%
Florida State	7%	8%	8%	4%
Texas A&M	4%	5%	4%	4%
Lyndon	3%	3%	3%	3%
North Carolina State	2%	3%	2%	1%
Purdue	2%	2%	1%	2%
Ohio State	1%	1%	2%	2%
Other	30%	24%	28%	41%
Total	100%	100%	100%	100%
<i>n=364</i>				



13. Are you interested in reporting on climate change on-air?

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Yes	44%	73%	45%	34%	21%	29%
No	38%	11%	32%	53%	55%	60%
Don't know	18%	16%	23%	13%	24%	11%
<i>n=410</i>	100%	100%	100%	100%	100%	100%

14. How often do you currently report on climate change on-air?

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Never	45%	31%	36%	55%	66%	58%
Once or twice per year	35%	30%	41%	37%	34%	19%
Once or twice per quarter	13%	19%	17%	5%	0%	17%
Once or twice per month	5%	11%	4%	3%	0%	3%
More than twice per month	3%	9%	2%	1%	0%	3%
<i>n=412</i>	100%	100%	100%	100%	100%	100%

15. [If Q14 is more than never] When you report on climate change on-air, do your newsroom colleagues tend to be:

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Very supportive	15%	20%	14%	11%	0%	27%
Somewhat supportive	18%	22%	19%	20%	10%	0%
Mixed (some are supportive, and others unsupportive)	33%	36%	33%	27%	30%	40%
Somewhat unsupportive of your coverage	3%	5%	3%	0%	0%	7%
Very unsupportive	0%	0%	0%	0%	0%	0%
Typically don't acknowledge either way	31%	16%	30%	42%	60%	27%
<i>n</i> =228	100%	100%	100%	100%	100%	100%

16. Are you interested in educating the public about climate change outside of your on-air broadcasts?

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Yes	57%	84%	55%	51%	38%	43%
No	26%	10%	20%	36%	45%	43%
Don't Know	16%	6%	24%	13%	17%	14%
<i>n</i> =412	100%	100%	100%	100%	100%	100%

17. (If yes to Q. 16) Are you interested in using any of the following

		Total	Convinced that global warming is happening				
			Yes			Don't Know	No
			Mostly Human	Equally human &	Mostly Natural		
Community, civic, school presentations	Yes	90%	94%	88%	88%	82%	94%
	No	6%	0%	9%	7%	18%	6%
	Don't know	4%	6%	4%	5%	0%	0%
Your station's web site	Yes	67%	73%	78%	52%	64%	56%
	No	24%	19%	15%	35%	36%	31%
	Don't know	9%	8%	8%	13%	0%	13%
Your station's blog	Yes	64%	71%	61%	61%	55%	80%
	No	28%	21%	34%	26%	45%	13%
	Don't know	8%	8%	5%	13%	0%	7%
Your personal blog	Yes	56%	60%	51%	61%	40%	60%
	No	32%	23%	41%	25%	50%	33%
	Don't know	12%	17%	8%	15%	10%	7%
Radio	Yes	42%	56%	33%	38%	10%	60%
	No	46%	35%	51%	50%	70%	33%
	Don't know	12%	8%	16%	12%	20%	7%
Newspaper column	Yes	45%	55%	36%	45%	36%	50%
	No	41%	27%	51%	40%	36%	50%
	Don't know	15%	18%	14%	15%	27%	0%
<i>n=236</i>							

18. Which of the following statements best describes how often you currently educate the public about climate change off-air?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Never	24%	18%	19%	30%	25%	35%
Once or twice per year	38%	26%	42%	41%	57%	26%
Once or twice per quarter	22%	21%	25%	19%	11%	29%
Once or twice per month	9%	17%	10%	6%	7%	3%
More than twice per month	7%	19%	5%	4%	0%	6%
<i>N=402</i>	100%	100%	100%	100%	100%	100%

19. In the future would you like to report on climate change less frequently, about the same, or more frequently than now?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Less frequently	8%	1%	4%	15%	10%	11%
About the same	64%	42%	66%	64%	86%	86%
More frequently	28%	56%	30%	21%	3%	3%
<i>n=404</i>	100%	100%	100%	100%	100%	100%



20. Which of the following statements do you feel is most accurate?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
A very large majority of climate scientists (90% or more) have concluded that human-caused global warming is happening.	18%	58%	10%	10%	4%	3%
A large majority of climate scientists (75% or more) have concluded that human-caused global warming is happening	21%	21%	31%	17%	11%	9%
A majority of climate scientists (51% or more) have concluded that human-caused global warming is happening	14%	12%	20%	9%	11%	14%
Approximately equal numbers of climate scientists have concluded that human-caused global warming is happening and is <u>not</u> happening.	15%	5%	20%	11%	22%	20%
A majority of climate scientists (51% or more) have concluded that human-caused global warming is <u>not</u> happening.	4%	0%	1%	8%	4%	11%
A large majority of climate scientists (75% or more) have concluded that human-caused global warming is <u>not</u> happening	2%	0%	0%	5%	0%	9%
A very large majority of climate scientists (90% or more) have concluded that human-caused global warming is <u>not</u> happening	2%	0%	0%	3%	0%	11%

Continued Q. 20						
I don't feel any of these statements are accurate. (Please explain why.)	11%	1%	12%	12%	33%	6%
I don't know enough to say	13%	3%	7%	24%	15%	17%
<i>n</i> =396	100%	100%	100%	100%	100%	100%

21. Which of the following best describes your education? (check all that apply)

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
AS in an earth science discipline (other than meteorology, e.g., geography, atmospheric sciences)	3%	1%	3%	4%	9%	4%
AA in journalism, communication or related discipline	2%	3%	2%	2%	2%	0%
AA or AS in another discipline. Please specify:	2%	2%	4%	1%	0%	2%
BS in meteorology	34%	33%	32%	40%	27%	33%
BS in an earth science discipline (other than meteorology, e.g., geography, atmospheric sciences)	10%	11%	8%	14%	11%	8%
BA in journalism, communication or related discipline	15%	10%	17%	13%	23%	19%
BA or BS in another discipline.	8%	8%	7%	11%	2%	6%
MS in meteorology	6%	11%	7%	4%	2%	2%

<i>Continued Q. 21</i>						
MS in an earth science discipline (other than meteorology, e.g., geography, atmospheric sciences)	3%	6%	2%	2%	7%	2%
MA in journalism, communication or related discipline	2%	2%	3%	1%	0%	6%
MA or MS in another discipline.	1%	2%	0%	1%	0%	0%
PhD in meteorology	0%	1%	0%	0%	0%	0%
PhD in an earth science discipline (other than meteorology, e.g., geography, atmospheric sciences)	0%	0%	0%	0%	0%	2%
PhD in journalism, communication or related discipline	0%	0%	0%	0%	0%	0%
PhD in another discipline.	1%	1%	0%	0%	0%	2%
Other degrees, diplomas, or credits	12%	12%	14%	7%	16%	13%
<i>n</i> =433	100%	100%	100%	100%	100%	100%

22. At what institution (or institutions) did you receive your meteorology training?

	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Mississippi State	32%	29%	32%	27%	43%	41%
Penn State	7%	5%	11%	3%	10%	5%
UWisconsin-Madison	4%	4%	5%	3%	0	8%
Florida State	4%	6%	2%	4%	7%	3%
Univ. of Oklahoma	3%	5%	4%	1%	0	8%
Univ. of Kansas	3%	0	3%	6%	0	0
Lyndon State	2%	5%	3%	1%	3%	0
Northern Illinois Univ.	2%	4%	1%	2%	3%	5%
North Carolina State	2%	1%	1%	4%	3%	0
Cornell	2%	2%	3%	1%	0	0
Texas A&M	1%	2%	1%	1%	0	5%
Univ. of Missouri	1%	0	1%	2%	3%	0
Ohio State	1%	1%	1%	2%	0	0
University of Washington	1%	4%	1%	1%	0	0
SUNY Albany	1%	2%	1%	2%	0	0
Iowa State	1%	0	3%	1%	0	0
Purdue	1%	1%	1%	1%	0	0
Univ. Northern Colorado	1%	0	0	3%	0	0
Valparaiso University	1%	0	0	3%	0	0
Other	13%	18%	8%	16%	23%	5%
NA (no school listed)	17%	12%	20%	18%	3%	20%
<i>n</i> =434	100%	100%	100%	100%	100%	100%

23. [If Q22 is any answer other than NA] In what year did you receive your most recent meteorology training?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
2006-2011	31%	21%	37%	31%	27%	39%
2001-2005	20%	20%	24%	23%	12%	11%
1996-2000	18%	20%	15%	22%	19%	14%
1991-1995	10%	12%	7%	8%	15%	21%
1986-1990	5%	6%	5%	5%	0%	4%
1981-1985	6%	9%	6%	2%	8%	7%
1976-1980	6%	6%	4%	7%	12%	4%
1971-1975	2%	3%	0%	2%	8%	0%
1970 or earlier	1%	3%	1%	1%	0%	0%
<i>n=318</i>	100%	100%	100%	100%	100%	100%

24. Have you participated in any continuing education courses (or other organized learning experiences) on climate change?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Yes	42%	53%	44%	34%	41%	30%
No	55%	43%	53%	63%	52%	70%
Don't Know	3%	4%	2%	3%	7%	0%
<i>n=364</i>	100%	100%	100%	100%	100%	100%

25. [If Q24 is yes] How many continuing education courses (or other organized learning experiences) have you taken?

		Convinced that global warming is happening				
		Yes			Don't Know	No
	Total	Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
1	31%	35%	30%	31%	38%	18%
2	33%	23%	44%	31%	38%	18%
3	14%	14%	14%	14%	8%	27%
4	8%	7%	2%	14%	8%	27%
5	1%	2%	0%	3%	0%	0%
6+	11%	19%	11%	6%	8%	9%
<i>n=159</i>	100%	100%	100%	100%	100%	100%

26. One-day broadcast meteorologist workshops on climate science were held in 2009 and 2010 at The Field Museum in Chicago, the University of Miami, and a full-day "short course" was held in Portland, Oregon, as part of the AMS annual broadcast meteorologists meeting. Did you participate in any of these workshops?

		Convinced that global warming is happening				
		Yes			Don't Know	No
	Total	Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Yes	12%	28%	8%	8%	11%	0%
No	88%	72%	92%	92%	89%	100%
<i>n=363</i>	100%	100%	100%	100%	100%	100%

27. Which, if any, AMS and NWA Seals of approval do you have? (check all that apply)

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
The AMS CBM Seal	30%	34%	31%	29%	34%	15%
The AMS Seal	36%	38%	34%	40%	29%	40%
The NWA Seal	25%	24%	25%	25%	26%	30%
No Seal of Approval	8%	4%	10%	6%	11%	15%
<i>n=433</i>	100%	100%	100%	100%	100%	100%

28. Which best describes your current position?

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Primary anchor/Chief Meteorologist	43%	44%	37%	47%	54%	44%
Weekend anchor	22%	15%	27%	19%	23%	22%
Morning/Noon anchor	24%	18%	27%	26%	19%	22%
Other	12%	23%	9%	8%	4%	13%
<i>n=433</i>	100%	100%	100%	100%	100%	100%

29. Which of the following best describes your career prior to being employed as a weathercaster? (check all that apply)

	Total	Convinced that global warming is happening				
		Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
I have been a weathercaster my entire career.	50%	41%	54%	50%	59%	52%
I previously worked as a non-broadcast meteorologist.	8%	8%	9%	8%	3%	5%
I previously worked as a weathercaster on radio	8%	8%	8%	10%	6%	7%
I previously worked as a broadcast or print journalist.	11%	12%	11%	10%	18%	10%
I previously worked in some other capacity in TV news.	6%	5%	8%	4%	6%	10%
I previously worked as a scientist (other than meteorology).	2%	4%	2%	2%	0%	0%
I previously worked as an educator.	7%	12%	5%	6%	9%	10%
Other	7%	10%	4%	11%	0%	7%
<i>n</i> =433	100%	100%	100%	100%	100%	100%

30. What is your gender?

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
Male	82%	85%	71%	91%	86%	90%
Female	18%	15%	29%	9%	14%	10%
<i>n</i> =363	100%	100%	100%	100%	100%	100%

31. What is your age?

		Convinced that global warming is happening				
	Total	Yes			Don't Know	No
		Mostly Human Causes	Equally human & natural causes	Mostly Natural Causes		
18 to 29	13%	5%	16%	18%	7%	13%
30 to 39	30%	25%	32%	28%	29%	37%
40 to 49	29%	30%	28%	31%	32%	23%
50 to 59	22%	30%	18%	19%	21%	23%
60 to 69	6%	9%	5%	5%	7%	3%
70+	%	0%	0%	0%	4%	0%
<i>n</i> =366	100%	100%	100%	100%	100%	100%



4C

Part II: Questions asked of “Convinced” Meteorologists (i.e., Q1 = Yes)

1. How big of an obstacle is each of the following to your ability to report on climate change?

		Total	Mostly Human	Equally human & natural	Mostly Natural
Lack of time in the newscast	A large obstacle	71%	72%	74%	65%
	A moderate obstacle	16%	20%	15%	13%
	A small obstacle	7%	4%	6%	10%
	Not an obstacle at all	7%	4%	5%	12%

Lack of time for field reporting	A large obstacle	56%	57%	58%	54%
	A moderate obstacle	25%	26%	30%	18%
	A small obstacle	9%	9%	4%	14%
	Not an obstacle at all	10%	8%	8%	13%

My lack of sufficient knowledge about the subject	A large obstacle	5%	3%	7%	5%
	A moderate obstacle	24%	26%	29%	16%
	A small obstacle	41%	37%	46%	36%
	Not an obstacle at all	30%	35%	17%	43%

Lack of news management support at my station	A large obstacle	19%	23%	17%	20%
	A moderate obstacle	23%	27%	29%	12%
	A small obstacle	30%	27%	30%	32%
	Not an obstacle at all	28%	23%	23%	37%

Lack of general management or owner support at my station	A large obstacle	18%	26%	16%	16%
	A moderate obstacle	18%	22%	20%	13%
	A small obstacle	27%	26%	29%	25%
	Not an obstacle at all	37%	27%	34%	46%

Lack of viewer support (i.e., negative reactions by viewers)	A large obstacle	13%	17%	10%	13%
	A moderate obstacle	26%	23%	28%	27%
	A small obstacle	33%	37%	36%	27%
	Not an obstacle at all	28%	23%	26%	33%

Continued Q1 Lack of access to credible scientific information	A large obstacle	11%	5%	8%	19%
	A moderate obstacle	21%	15%	27%	18%
	A small obstacle	27%	21%	29%	28%
	Not an obstacle at all	41%	59%	37%	35%

Lack of access to appropriate visuals/graphics to use in reporting	A large obstacle	15%	12%	15%	17%
	A moderate obstacle	31%	27%	37%	27%
	A small obstacle	28%	33%	22%	31%
	Not an obstacle at all	26%	28%	25%	26%

Scientific uncertainty about climate change	A large obstacle	21%	1%	20%	35%
	A moderate obstacle	27%	12%	34%	29%
	A small obstacle	29%	40%	31%	19%
	Not an obstacle at all	23%	47%	14%	17%

Other (please list below)	A large obstacle	41%	22%	41%	53%
	A moderate obstacle	10%	0%	18%	7%
	A small obstacle	2%	11%	0%	0%
	Not an obstacle at all	46%	67%	41%	40%

n=335

2. How helpful would each of the following resources be in improving your ability to report on climate change?

		Total	Mostly Human	Equally human & natural	Mostly Natural
Specific estimates/projections of climate change for your region of the country.	Very helpful	56%	74%	58%	39%
	Moderately helpful	23%	20%	26%	22%
	A little helpful	12%	5%	15%	12%
	Not at all helpful	9%	1%	1%	27%

High-quality graphics/animations that you could use on-air.	Very helpful	61%	78%	65%	42%
	Moderately helpful	20%	14%	22%	21%
	A little helpful	10%	7%	7%	16%
	Not at all helpful	9%	1%	5%	20%

Continued Q2. High quality content that you could use on your station or blog.	Very helpful	55%	72%	57%	42%
	Moderately helpful	21%	15%	23%	22%
	A little helpful	14%	8%	16%	17%
	Not at all helpful	9%	5%	4%	19%

Access to your state climatologist for interviews or information.	Very helpful	41%	51%	41%	34%
	Moderately helpful	33%	22%	38%	35%
	A little helpful	18%	22%	16%	19%
	Not at all helpful	8%	5%	5%	13%

Access to local climate scientists for on-camera interviews.	Very helpful	44%	58%	46%	32%
	Moderately helpful	28%	25%	30%	29%
	A little helpful	18%	13%	19%	21%
	Not at all helpful	9%	4%	5%	18%

Access to local climate scientists who can rapidly answer any questions you might have.	Very helpful	49%	63%	51%	36%
	Moderately helpful	29%	21%	32%	31%
	A little helpful	15%	13%	13%	20%
	Not at all helpful	7%	3%	4%	14%

Access to local climate scientists who are willing to contribute blog postings.	Very helpful	29%	41%	25%	26%
	Moderately helpful	23%	22%	23%	25%
	A little helpful	30%	27%	36%	25%
	Not at all helpful	17%	11%	16%	25%

Online education materials prepared specifically for broadcast meteorologists that explain the science behind different aspects of climate change.	Very helpful	50%	58%	52%	42%
	Moderately helpful	29%	29%	33%	25%
	A little helpful	13%	9%	10%	22%
	Not at all helpful	7%	4%	5%	11%

Publications that answer climate change related questions at a level appropriate for the general public (i.e., presuming no science education beyond basic high school level).	Very helpful	46%	61%	45%	35%
	Moderately helpful	35%	29%	40%	31%
	A little helpful	13%	7%	10%	21%
	Not at all helpful	7%	4%	4%	13%

Continued Q2. Suggested answers to questions the general public commonly asks about climate change.	Very helpful	44%	60%	43%	34%
	Moderately helpful	29%	24%	35%	24%
	A little helpful	16%	12%	15%	21%
	Not at all helpful	11%	4%	8%	21%

A list of credible online climate change resources.	Very helpful	51%	63%	50%	43%
	Moderately helpful	29%	24%	34%	25%
	A little helpful	14%	11%	13%	19%
	Not at all helpful	6%	3%	4%	12%

Access to peer-reviewed science journals.	Very helpful	26%	43%	21%	20%
	Moderately helpful	38%	34%	43%	35%
	A little helpful	26%	14%	32%	28%
	Not at all helpful	9%	8%	5%	16%

PowerPoint presentations to use in public speaking events.	Very helpful	42%	55%	38%	38%
	Moderately helpful	29%	27%	28%	31%
	A little helpful	18%	12%	24%	14%
	Not at all helpful	11%	5%	11%	16%

A list of local climate-related citizen science projects to which you can refer interested viewers.	Very helpful	29%	43%	28%	19%
	Moderately helpful	35%	37%	36%	32%
	A little helpful	24%	16%	28%	24%
	Not at all helpful	12%	4%	8%	24%

Methods for driving viewers to your station's website for additional information.	Very helpful	33%	39%	33%	27%
	Moderately helpful	30%	32%	30%	29%
	A little helpful	25%	21%	28%	24%
	Not at all helpful	12%	8%	9%	19%

Examples of other weathercasters who have successfully included climate change in their broadcasts or in public speaking events.	Very helpful	38%	45%	42%	29%
	Moderately helpful	33%	35%	30%	34%
	A little helpful	18%	12%	22%	17%
	Not at all helpful	11%	8%	7%	19%



Continued Q2.	Very helpful	36%	25%	36%	41%
Other (please specify below)	Moderately helpful	14%	0%	9%	24%
	A little helpful	8%	13%	9%	6%
	Not at all helpful	42%	63%	46%	29%
<i>n=317</i>					

3. Climate change is projected to impact different communities in different ways, depending on their location. How interested would you be in reporting on local angles to each of the following potential stories about climate change?

		Total	Mostly Human	Equally human & natural	Mostly Natural
Changes in extreme heat events (actual or projected)	Very interested	41%	61%	42%	23%
	Moderately interested	32%	25%	35%	32%
	Slightly interested	18%	15%	19%	20%
	Not at all interested	8%	0%	4%	21%
	This topic is not relevant in my region of the country	1%	0%	1%	3%

Changes in rainfall (actual or projected)	Very interested	48%	68%	50%	31%
	Moderately interested	31%	23%	37%	30%
	Slightly interested	12%	9%	9%	17%
	Not at all interested	8%	0%	4%	20%
	This topic is not relevant in my region of the country	1%	0%	0%	2%

Changes in flooding (actual or projected)	Very interested	44%	65%	47%	25%
	Moderately interested	34%	29%	39%	32%
	Slightly interested	12%	7%	10%	19%
	Not at all interested	9%	0%	4%	22%
	Not relevant	1%	0%	0%	2%

Changes in droughts (actual or projected)	Very interested	44%	68%	42%	28%
	Moderately interested	31%	20%	41%	26%
	Slightly interested	16%	11%	13%	25%
	Not at all interested	8%	1%	4%	20%
	Not relevant	1%	0%	1%	2%

Continued Q3. Changes in snowstorms (actual or projected)	Very interested	41%	61%	41%	26%
	Moderately interested	26%	17%	34%	21%
	Slightly interested	14%	8%	13%	20%
	Not at all interested	10%	1%	5%	23%
	Not relevant	9%	12%	8%	9%

Changes in water quality (actual or projected)	Very interested	30%	53%	30%	13%
	Moderately interested	30%	24%	36%	26%
	Slightly interested	23%	15%	26%	26%
	Not at all interested	16%	8%	7%	34%
	Not relevant	2%		2%	2%

Changes in hurricanes (actual or projected)	Very interested	32%	43%	28%	29%
	Moderately interested	19%	21%	21%	13%
	Slightly interested	21%	20%	22%	21%
	Not at all interested	11%	3%	8%	21%
	Not relevant	18%	13%	22%	15%

Changes in sea-level and associated storm surges (actual or projected)	Very interested	31%	47%	27%	23%
	Moderately interested	23%	21%	27%	19%
	Slightly interested	17%	16%	16%	20%
	Not at all interested	13%	5%	10%	23%
	Not relevant	16%	11%	20%	14%

Changes in forest fires (actual or projected)	Very interested	29%	53%	27%	13%
	Moderately interested	22%	21%	26%	17%
	Slightly interested	24%	20%	24%	27%
	Not at all interested	16%	5%	12%	28%
	Not relevant	9%	1%	10%	14%

Impacts (actual or projected) on seasonal events (e.g., first frosts, plant budding)	Very interested	33%	50%	35%	17%
	Moderately interested	38%	32%	43%	37%
	Slightly interested	19%	16%	20%	22%
	Not at all interested	9%	1%	2%	23%
	Not relevant	1%	1%	1%	2%

Continued Q3. Impacts (actual or projected) on air quality	Very interested	30%	47%	32%	12%
	Moderately interested	32%	33%	35%	28%
	Slightly interested	25%	16%	26%	30%
	Not at all interested	12%	3%	7%	26%
	Not relevant	2%	1%	1%	4%

Impacts (actual or projected) on human health	Very interested	33%	50%	37%	13%
	Moderately interested	34%	32%	36%	32%
	Slightly interested	22%	13%	22%	28%
	Not at all interested	11%	4%	5%	25%
	Not relevant	1%	1%	0%	2%

Impacts (actual or projected) on agriculture	Very interested	35%	46%	38%	22%
	Moderately interested	37%	29%	45%	33%
	Slightly interested	18%	21%	14%	21%
	Not at all interested	9%	3%	2%	22%
	Not relevant	2%	1%	2%	3%

Impacts (actual or projected) on livestock	Very interested	24%	35%	26%	12%
	Moderately interested	28%	19%	38%	21%
	Slightly interested	33%	39%	28%	35%
	Not at all interested	13%	4%	7%	28%
	Not relevant	3%	4%	2%	4%

Impacts (actual or projected) on home gardening/landscaping	Very interested	21%	34%	20%	13%
	Moderately interested	35%	36%	39%	28%
	Slightly interested	31%	25%	34%	33%
	Not at all interested	12%	4%	7%	24%
	Not relevant	1%	1%	0%	2%

Impacts (actual or projected) on wildlife	Very interested	24%	38%	24%	14%
	Moderately interested	33%	30%	37%	28%
	Slightly interested	29%	29%	31%	28%
	Not at all interested	12%	1%	7%	27%
	Not relevant	2%	1%	1%	3%



Continued Q3. Impacts (actual or projected) on local ecosystems (e.g., early flowering inhibiting pollination when bees/birds are not yet in active)	Very interested	27%	41%	27%	16%
	Moderately interested	29%	31%	33%	23%
	Slightly interested	30%	23%	33%	32%
	Not at all interested	13%	4%	7%	27%
	Not relevant	1%	1%	0%	2%

Impacts (actual or projected) on the local economy	Very interested	38%	55%	38%	25%
	Moderately interested	33%	25%	40%	31%
	Slightly interested	17%	16%	17%	18%
	Not at all interested	11%	3%	5%	25%
	Not relevant	1%	1%	0%	2%

Ways to protect human health	Very interested	31%	42%	35%	15%
	Moderately interested	34%	33%	37%	30%
	Slightly interested	24%	24%	24%	24%
	Not at all interested	11%	0%	4%	30%
	Not relevant	1%	1%	0%	1%

Ways to protect livestock and pets	Very interested	23%	29%	27%	14%
	Moderately interested	31%	33%	36%	22%
	Slightly interested	33%	30%	33%	34%
	Not at all interested	12%	5%	4%	30%
	Not relevant	1%	3%	0%	1%

Ways to protect commercial crops	Very interested	26%	25%	34%	16%
	Moderately interested	30%	36%	34%	20%
	Slightly interested	29%	32%	24%	33%
	Not at all interested	14%	6%	7%	31%
	Not relevant	1%	3%	1%	1%

Ways to protect home gardens/landscaping	Very interested	16%	27%	15%	7%
	Moderately interested	38%	34%	47%	29%
	Slightly interested	33%	34%	31%	34%
	Not at all interested	13%	3%	7%	28%
	Not relevant	1%	1%	0%	1%

Continued Q3. Ways to protect homes and other buildings	Very interested	19%	33%	20%	8%
	Moderately interested	38%	34%	44%	34%
	Slightly interested	29%	29%	31%	27%
	Not at all interested	12%	3%	6%	29%
	Not relevant	1%	1%	0%	1%
Ways to protect critical community infrastructure (e.g., water supplies; sewage treatment facilities)	Very interested	25%	36%	29%	10%
	Moderately interested	32%	30%	40%	23%
	Slightly interested	29%	26%	24%	37%
	Not at all interested	14%	7%	7%	29%
	Not relevant	1%	1%	1%	1%
New records (e.g., hottest day; most precipitation; latest first frost)	Very interested	51%	69%	49%	39%
	Moderately interested	28%	20%	35%	25%
	Slightly interested	13%	11%	12%	17%
	Not at all interested	8%	0%	4%	19%
	Not relevant	0%	0%	0%	1%
Opportunities to participate in local climate-related citizen science projects	Very interested	21%	33%	19%	14%
	Moderately interested	32%	35%	39%	21%
	Slightly interested	28%	21%	28%	34%
	Not at all interested	17%	9%	12%	30%
	Not relevant	1%	1%	2%	1%
Connections between global climate change and local impacts	Very interested	39%	61%	41%	20%
	Moderately interested	32%	21%	39%	32%
	Slightly interested	18%	16%	15%	24%
	Not at all interested	9%	1%	4%	23%
	Not relevant	1%	1%	2%	1%
Other (please specify below)	Very interested	25%	18%	31%	25%
	Moderately interested	10%	18%	15%	4%
	Slightly interested	6%	0%	8%	8%
	Not at all interested	27%	0%	8%	50%
	Not relevant	31%	64%	39%	13%
<i>n=317</i>					

4. Have each of the following sources of evidence helped to convince you that global warming is occurring?

		Total	Mostly Human	Equally human & natural	Mostly Natural
Directly observed indicators of climate collected over the past century or so (e.g., temperatures, precipitation)	Yes	74%	91%	80%	53%
	No	26%	9%	20%	48%
Indirect indicators of climate over the past thousand years or longer (e.g., tree ring data, ice core samples)	Yes	69%	82%	73%	54%
	No	31%	18%	27%	47%
Global computer models that project climate 50 to 100 years into the future	Yes	38%	72%	39%	11%
	No	62%	28%	61%	89%
The professional judgment of experts	Yes	65%	94%	70%	35%
	No	36%	7%	30%	65%
The direct personal experience of people you know and trust	Yes	48%	66%	49%	33%
	No	52%	34%	51%	67%
Your own professional judgment	Yes	80%	91%	78%	74%
	No	20%	9%	22%	26%
Your own direct personal experience	Yes	48%	63%	45%	39%
	No	53%	37%	55%	62%

n=310

5. Do you agree or disagree with the following statements?

		Total	Mostly Human	Equally human & natural	Mostly Natural
My community has already experienced the impact of climate change in the past 20 years.	Strongly agree	13%	40%	7%	2%
	Agree	38%	41%	46%	25%
	Disagree	21%	8%	20%	32%
	Strongly disagree	9%	0%	2%	24%
	Don't know	19%	12%	25%	17%

n=315

My community will experience the impacts of climate change in the next 20 years.	Strongly agree	18%	54%	10%	3%
	Agree	44%	37%	57%	31%
	Disagree	15%	3%	13%	28%
	Strongly disagree	6%	0%	1%	16%
	Don't know	18%	7%	20%	22%

n=315

I have personally observed the impacts of climate change.	Strongly agree	13%	38%	8%	0%
	Agree	31%	30%	40%	21%
	Disagree	25%	11%	28%	31%
	Strongly disagree	12%	1%	5%	29%
	Don't know	20%	20%	21%	18%

n=313

6. [If response to the question above is “Strongly Agree” or “Agree”] What climate change impacts have you personally observed? (Answers are presented in the Appendix.)

7. Where did you personally observe the impacts of climate change?

		Total	Mostly Human Causes	Equally Human & Natural	Mostly Natural Causes
In my community or nearby areas	Yes	34%	59%	38%	13%
	No	66%	41%	62%	87%

Elsewhere in the state where I currently live	Yes	28%	49%	30%	11%
	No	72%	51%	70%	89%

Elsewhere in the United States/please specify	Yes	11%	26%	10%	4%
	No	89%	74%	90%	96%

Outside the United States/please specify	Yes	6%	17%	3%	2%
	No	94%	83%	97%	98%

n=132

8. Over the next several years, we will be developing climate change education resources for use by TV meteorologists. If you are willing, we would like to email you a few requests for feedback on drafts of these resources. NWA and AMS Sealholders can receive recertification credits for participating in this activity. Would you be willing to provide us with feedback on these resources as we begin to develop them?

	Total	Mostly Human	Equally human & natural	Mostly Natural
Yes	64%	80%	66%	49%
Maybe, but I would like further information before deciding	21%	13%	24%	24%
No	15%	7%	10%	28%
<i>n=307</i>				

Part III. Questions asked of “Undecided” Meteorologists (i.e., Q1 = Don’t know)

1. How interested are you in learning more about the following topics?

	Very interested	Somewhat interested	Don’t know	Somewhat disinterested	Very disinterested
Similarities and differences between weather and climate models	41%	45%	3%	0%	10%
Why scientists believe that climate models can make reasonably accurate projections of the future climate, when weather models break down after several days	41%	45%	0%	0%	14%
The ability of climate models to “reproduce” past climate events	29%	61%	0%	0%	11%
The reliability of “proxy” data (like ice cores and tree rings) to describe past changes in the climate	35%	55%	0%	0%	10%
How climate models determine how much of recent climate change is due to natural causes and how much to human causes	48%	45%	0%	0%	7%
How past climate changes in Earth’s history are different than the climate changes projected for the next hundred years	31%	62%	0%	0%	7%
The history of climate change impacts on humans	28%	66%	0%	0%	7%
<i>n</i> =29					

2. In your view, what does the term “scientific consensus” mean?

The agreement of at least 51% of scientists	14%
The agreement of a large majority (at least 75%) of scientists	54%
The agreement of nearly all scientists (90%+)	21%
The unanimous agreement of all scientists	0%
Other	11%

n=28

3. How strongly do you agree or disagree with the following statements?

	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(a) The scientific evidence currently being used to <u>support</u> claims of human-caused climate change will eventually be shown to be incorrect.	0%	28%	62%	10%	0%
(b) The claims of human-caused climate change are a cover for a political agenda to increase government control of society.	7%	34%	24%	17%	17%
(c) The claims of human-caused climate change are preposterous, since the climate system is vast, chaotic, and past changes in climate were naturally induced.	0%	38%	38%	21%	3%
(d) The claims of human-caused climate change are "junk science," since they are based on climate models and hypotheses that cannot be verified.	0%	28%	45%	24%	3%
(e) The uncertainties inherent in the claims of human-caused climate change prove that it would be foolish to take dramatic actions now; instead more study of the climate system is needed.	17%	48%	24%	10%	0%
(f) The belief that humans could influence the climate system is hubris; the earth's climate is in God's hands.	4%	11%	29%	43%	14%
(g) The claims of human-caused climate change are a cover by climate scientists to ensure that they continue to receive research grants.	21%	38%	28%	10%	3%

Q3 continued					
(h) Climate scientists have been caught changing their results to make climate change appear more certain than it is.	28%	31%	35%	3%	3%
(i) Climate scientists have been caught conspiring to suppress research results that they disagree with.	28%	45%	17%	3%	7%
(j) Even though climate change is probably not happening, some of the proposed “solutions” to climate change – such as becoming more energy efficient, and developing clean renewable energy sources – make sense for America regardless.	34%	66%	0%	0%	0%
(k) It is difficult to engage with climate scientists because they treat anyone who disagrees with them as ignorant.	38%	24%	21%	17%	0%
(l) My news audiences would not be supportive of reports on climate change.	7%	46%	11%	32%	4%
(m) The evidence currently being used to dispute claims of human-caused climate change is "junk science" funded primarily by corporate interests.	3%	17%	45%	28%	7%
(n) Human-caused climate change reveals the "true cost" of society's current reliance on fossil fuels.	0%	17%	38%	38%	7%
(o) The evidence of human-caused climate change is an "early warning" of vastly more harmful environmental impacts to come; if society waits to act, it will be too late to avert many tragic consequences.	0%	11%	29%	43%	18%
<i>n=29</i>					

4. How much do you trust or distrust the following?	Strongly trust	Somewhat trust	Somewhat distrust	Strongly distrust
The validity of temperature records from the last 150 years.	7%	55%	31%	7%
The validity of indirect or “proxy” data (like ice cores and tree rings) used to describe the climate in the past.	10%	52%	38%	0%
The reliability of indirect or “proxy” data in representing past climatic variables.	3%	45%	48%	3%
The relevance of indirect or “proxy” data (like ice cores and tree rings) for the understanding current and future climate conditions.	3%	52%	38%	7%
The ways in which climate scientists handle inconsistencies in data sources (for example, when weather stations are moved, or satellites fail).	0%	21%	52%	28%
The analytic techniques used by climate scientists (i.e., the ways in which they analyze their data)	3%	38%	55%	3%
Computer models of climate change.	3%	17%	66%	14%
The reliability of climate models in “replicating” past climate events.	0%	29%	61%	11%
The ability of climate models to measure how much of recent climate change is due to natural causes and how much to human causes.	3%	21%	59%	17%
The motivations of climate scientists.	0%	28%	55%	17%
<i>n</i> = 29				

	No	Yes
5. Do you want AMS to do anything differently with regard to climate change?	74%	26%
6. Do you want NWA to do anything differently with regard to climate change?	88%	12%
7. Do you want your state climatologist to do anything differently with regard to climate change?	89%	11%
8. Do you want NOAA to do anything differently with regard to climate change?	77%	23%
9. Do you want climate scientists to do anything differently with regard to climate change?	62%	38%
<i>n</i> =29		

10. Over the next several years, we will be developing climate change education resources for use by TV meteorologists. To ensure that these materials are responsive to the needs and interests of meteorologists like you, we intend to host several one-hour phone conversations with small groups of 3 or 4 meteorologists each. NWA & AMS Sealholders will receive recertification credits for participating in this follow-up activity. Would you be willing to participate in one of these discussions to provide us guidance on how best to meet your climate change information needs and interests?

Yes	32%
No	68%
<i>n</i> =28	

[If yes, ask:] In general, what is the most convenient time for you to participate a one-hour discussion? (check all that apply)

Weekday morning (8 to noon)	50%
Weekday afternoon (noon to 6)	25%
Weekend day	25%
<i>n</i> =7	



4C

Part IV. Questions asked of “Unconvinced” Meteorologists (i.e., Q1 = No)

1. Do you agree or disagree with the following statements?					
	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
The scientific evidence currently being used to support claims of human-caused climate change will eventually be shown to be incorrect.	38%	35%	21%	6%	0%
The claims of human-caused climate change are a cover for a political agenda to increase government control of society.	41%	29%	15%	15%	0%
The claims of human-caused climate change are preposterous, since the climate system is vast, chaotic, and past changes in climate were naturally induced.	43%	40%	6%	11%	0%
The claims of human-caused climate change are "junk science," since they are based on climate models and hypotheses that cannot be verified.	35%	35%	6%	24%	0%
The uncertainties inherent in the claims of human-caused climate change prove that it would be foolish to take dramatic actions now; instead more study of the climate system is needed.	51%	27%	3%	18%	0%
The belief that humans could influence the climate system is hubris; the earth's climate is in God's hands.	12%	38%	3%	38%	9%
The claims of human-caused climate change are a cover by climate scientists to ensure that they continue to receive research grants.	32%	32%	12%	21%	3%
Climate scientists have been caught changing their results to make climate change appear more certain than it is.	41%	41%	15%	3%	0%

<i>Q1 continued</i>					
Climate scientists have been caught conspiring to suppress research results that they disagree with.	56%	18%	15%	12%	0%
Even though climate change is probably not happening, some of the proposed “solutions” to climate change – such as becoming more energy efficient, and developing clean renewable energy sources – make sense for America regardless.	39%	52%	3%	3%	3%
It is difficult to engage with climate scientists because they treat anyone who disagrees with them as ignorant.	50%	35%	9%	6%	0%
My news audiences would not be supportive of reports on climate change.	9%	24%	27%	36%	3%

n=35



4C

2. Have the following contributed to your belief that human-induced climate change is not happening? (check all that apply)

	Yes	No
Directly observed indicators of climate (e.g., temperatures, precipitation) collected over the past century or so do not indicate that the climate is changing.	61%	39%
Indirect indicators of climate (e.g., tree ring data, ice core samples) collected recently but spanning over the past several hundred thousand years or longer do not indicate that the climate changing.	40%	60%
The global models that project climate 50 to 100 years into the future are based on <u>flawed data</u> .	68%	32%
The global models that project climate 50 to 100 years into the future are based on <u>inadequate and incomplete data</u> .	87%	13%
The global models that project climate 50 to 100 years into the future are based on <u>flawed assumptions</u> .	81%	19%
The experts who I trust most have concluded that climate change is not happening.	65%	35%
My own evaluation of the <u>data</u> has convinced me that climate change is not happening.	70%	30%
My own evaluation of the <u>climate models</u> has convinced me that climate change is not happening.	40%	60%
The climate always changes; current warming is part of natural climate variability.	100%	0%
Land-use changes and other non-CO2 variables have not been adequately considered.	73%	27%

n=35

3. How much do you trust or distrust the following?

	Strongly trust	Somewhat trust	Somewhat distrust	Strongly distrust
The validity of temperature records from the last 150 years.	16%	55%	23%	7%
The validity of indirect or “proxy” data (like ice cores and tree rings) used to describe the climate in the past.	10%	59%	24%	7%
The reliability of indirect or “proxy” data in representing past climatic variables.	3%	45%	41%	10%
The relevance of indirect or “proxy” data (like ice cores and tree rings) for the understanding current and future climate conditions.	7%	46%	36%	11%
The ways in which climate scientists handle inconsistencies in data sources (for example, when weather stations are moved, or satellites fail).	3%	26%	42%	29%
The analytic techniques used by climate scientists (i.e., the ways in which they analyze their data)	0%	43%	40%	17%
Computer models of climate change.	0%	14%	59%	28%
The reliability of climate models in “replicating” past climate events.	0%	31%	55%	14%
The ability of climate models to measure how much of recent climate change is due to natural causes and how much to human causes.	0%	23%	30%	47%
The motivations of climate scientists.	0%	10%	47%	43%
<i>n</i> =35				

	No	Yes
4. Do you want AMS to do anything differently with regard to climate change?	31%	69%
5. Do you want NWA to do anything differently with regard to climate change?	68%	32%
6. Do you want your state climatologist to do anything differently with regard to climate change?	68%	32%
7. Do you want NOAA to do anything differently with regard to climate change?	50%	50%
8. Do you want climate scientists to do anything differently with regard to climate change?	28%	72%
<i>n=33</i>		

9. Climate scientists often assume that the reason climate skeptics don't believe in human-caused climate change is because they don't understand the science. What do you think climate scientists fail to understand about your conclusion that climate change is not happening?

(Answers are presented in the Appendix)

10. Over the next several years, we will be developing a conflict analysis and resolution process between climate scientists and TV meteorologists who reject the body of climate science research. The objective of this process is to better understand why these two groups of professionals have reached different conclusions about climate change, and to identify ways to address both group's concerns. To that end, over the next six months, we will be hosting several half-day conflict analysis workshops with TV meteorologists and climate scientists. NWA & AMS Sealholders will receive recertification credits for participating in this follow-up activity. Would you be potentially willing to participate in one of these sessions to give us guidance on how best to address your concerns about climate science?

Yes	No
52%	48%
<i>n=31</i>	

11. (If yes) In general, what is the most convenient day of the week for you to participate? (check all that apply)

Monday	18%
Tuesday	16%
Wednesday	16%
Thursday	14%
Friday	14%
Saturday	14%
Sunday	6%
<i>n=16</i>	100%

