

## Introduction

As 2013 began, the National Oceanographic and Atmospheric Administration (NOAA) identified 2012 as the warmest year on record in the United States, with national temperatures exceeding three degrees above the 20th century average. Along with the nation's record levels of warmth during 2012 came notable weather and climate events, including severe drought conditions throughout large regions and the historic devastation of Superstorm Sandy in the Northeast. As Americans experienced the heat and extreme weather conditions of 2012, an increasing number of citizens indicated that they believed global warming was occurring and that they held this view because of the weather-related phenomena they were experiencing. These are among the key findings of the Fall 2012 versions of the National Surveys on Energy and Environment (NSEE) from the Center for Local, State, and Urban Policy at the Gerald R. Ford School of Public Policy at the University of Michigan and the Institute of Public Opinion at Muhlenberg College. These surveys included a total of 917 interviews in the period before Superstorm Sandy struck in late October (early Fall iteration) and 998 interviews conducted after the storm's arrival (late Fall iteration). This is the first time the NSEE has been run twice during the same season in order to capture possible effects from meteorological phenomena on public perceptions regarding global warming.

## Key Findings

1. An increasing number of Americans indicate that there is evidence of global warming, with over two out of three individuals in the United States now expressing a belief that the planet has warmed over the past four decades.
2. For the first time since Fall 2008, a majority (51%) of self-identified Republicans stated that they think global warming is occurring, as of late Fall 2012.
3. Among the growing number of Americans who believe that global warming is occurring, confidence levels have increased. The results of the NSEE Fall versions indicate that six out of 10 of those Americans who believe global warming is happening are very confident in their appraisal.
4. More Americans than at any time since 2008 attribute increasing global temperatures entirely to the activities of man, with over 4 out of 10 individuals who believe global warming is occurring stating that human activity is the cause of the change.
5. Americans increasingly cite their experiences with weather as the primary factor behind their conclusions regarding global warming's existence, with substantial numbers pointing to factors such as droughts, heat waves, and stronger storms as key reasons for their views on climate change.
6. In comparisons between surveys before and after the landfall of Superstorm Sandy in October 2012, the importance of hurricanes as a factor cited by individuals in their belief that global warming is happening rose significantly.
7. Among the shrinking percentage of Americans who doubt global warming's existence, there appears to be both a decreased impact of personal experiences on their views on this subject and an increased prominence for personal religious and political factors in the determination of their doubts.

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## Belief in Global Warming Continues to Rebound

The Fall 2012 versions of the NSEE indicate that public belief in the existence of global warming continues to rebound after a period of decline. In the two Fall iterations, over two out of three Americans agreed that there is solid evidence that average temperatures on Earth have increased over the past four decades. The percentage of Americans believing in global warming is also higher than at any time since Fall 2008, when 72% of those interviewed reported that they thought the planet was warming. As can be seen in Table One, the decline in belief in global warming reached its lowest point in Spring 2010, with fairly steady growth in belief found in surveys beginning in Fall 2011.

**Table 1**

“Is there solid evidence that the average temperature on Earth has been getting warmer over the past four decades?”

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Yes	72%	65%	52%	58%	55%	62%	65%	68%	67%
No	17%	20%	36%	26%	32%	26%	24%	21%	22%
Not Sure	11%	15%	13%	16%	12%	12%	11%	11%	12%

The results of the NSEE in late Fall 2012 show that belief in global warming is widespread across many demographic groups in the United States, and further, that substantial majorities of Americans across these demographic divides believe that there is solid evidence of the phenomenon, as demonstrated in Table Two.

The only individual-level characteristic that reveals stark differences among Americans regarding the existence of global warming continues to be partisan standing. Namely, while overwhelming majorities of Democrats and Independents believe that there is evidence of global warming, Republicans are more divided on the matter, with 51% maintaining the position that there is evidence of the phenomenon, and 37% indicating that there is not such evidence.

**Table 2**

“Is there solid evidence that the average temperature on Earth has been getting warmer over the past four decades?”  
by selected demographic categories

	Yes	No	Not Sure
Democrat	79%	12%	9%
Independent	71%	16%	13%
Republican	51%	37%	13%
Male	68%	23%	9%
Female	66%	20%	14%
College Degree	75%	20%	6%
No College Degree	62%	22%	16%
White	67%	22%	11%
Racial Minority	67%	20%	14%
20-40K	64%	21%	14%
40-80K	79%	14%	9%
80K +	67%	26%	7%
18-29	73%	20%	6%
30-44	66%	19%	15%
45-64	66%	21%	13%
65+	61%	27%	12%

Note: NSEE Late Fall 2012



Although less likely to perceive evidence of global warming than their Democratic and independent counterparts, the percentage of Republicans who believe that global warming is happening has risen from its low point of 33% during Spring 2010 to 51% during late Fall 2012, as Table Three demonstrates. This recent increase in the percentage of Republicans who believe in global warming’s existence has almost completely erased the decline that occurred between 2008 and 2010.

**Table 3**  
 “Is there solid evidence that the average temperature on Earth has been getting warmer over the past four decades?”  
 Among Republican respondents

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Yes	53%	49%	33%	41%	42%	47%	41%	47%	51%
No	34%	36%	55%	43%	48%	42%	49%	40%	37%
Not Sure	13%	15%	13%	17%	11%	11%	10%	13%	13%

Among the growing number of Americans overall who believe global warming is occurring, there is also increased confidence in this position. In both of the Fall 2012 surveys, over six out of 10 Americans who believed that global warming was occurring said that they were “very confident” of this view, as noted in Table Four. More broadly, the three surveys in the 2012 calendar year (Spring, early Fall, late Fall) indicated the highest levels of confidence over the course of the NSEE regarding the existence of global warming. When combined with the larger number of Americans agreeing that average temperatures have increased, it would appear that belief in global warming became more strongly established among American citizens during 2012 overall.

**Table 4**  
 “How confident are you that the average temperature on Earth is increasing?”  
 Among respondents indicating there is evidence that temperatures on Earth are increasing

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Very Confident	58%	40%	53%	55%	50%	49%	63%	63%	61%
Fairly Confident	38%	52%	39%	37%	43%	44%	32%	31%	35%
Not Too Confident	3%	7%	6%	6%	5%	5%	4%	4%	4%
Not Confident At All	0%	1%	1%	1%	2%	2%	1%	1%	1%

The Fall 2012 NSEE surveys also show that more Americans are attributing global warming to human activity as opposed to natural patterns, or some combination between them. In both the pre- and post-Sandy surveys, over four out of 10 of the respondents who indicated that global temperatures were rising attributed those increases solely to human activity (43 percent in early Fall 2012 and 42 percent in late Fall 2012). These are the highest levels ever recorded in the history of the survey, as indicated in Table Five. The combination of more Americans believing that global warming is taking place with a larger number attributing the increases only to anthropogenic activity marks an important development in terms of public opinion on this issue.

**Table 5**

“Is the Earth getting warmer because of human activity such as burning fossil fuels, or mostly because of natural patterns in the Earth’s environment?”

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Human Activity	36%	36%	41%	37%	40%	40%	37%	43%	42%
Natural Patterns	18%	12%	18%	18%	19%	21%	15%	18%	19%
A Combination	41%	51%	32%	41%	38%	35%	45%	35%	37%

Note: Asked only of respondents who indicated there was evidence that temperatures on Earth are increasing.



## The Factors Behind the Beliefs

As more Americans express a belief that global temperatures are rising, their observations of and experiences with warming temperatures and changing weather continue to play a major role in leading them to their conclusions on global warming. When asked to identify the primary factor that caused them to believe that temperatures on Earth are increasing, respondents cite warmer temperatures and changes in the weather as the first and second most common categories of response, respectively, as shown in Table Six.

When American belief in climate change hit its low point during Spring 2010, only 30% of those who thought the Earth was warming identified observations of temperature or weather changes as the primary reason for their views on global warming, as also indicated in Table Six. But as the rebound in American belief in global warming has strengthened since Fall 2011, an average of 44% of those who think the Earth is warming stated that observations of weather or temperature changes were the primary reason for their view.

Examples of the weather- and temperature-related responses justifying the existence of climate change from the Fall 2012 NSEE included a middle-aged woman from Denver, Colorado who stated that “violent storms and warmer local weather” were the primary factors behind her position. In turn, a senior citizen from Willis, Texas noted that “there aren’t any winters anymore,” while a young woman in Wasco, California stated that “extreme weather changes” were the primary factor that shaped her views on global warming.

**Table 6**  
 “What is the primary factor that has caused you to believe that temperatures on Earth are increasing?”

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Glaciers Melting	19%	N/A	22%	17%	21%	14%	15%	13%	11%
Warmer Temps	19%	N/A	15%	22%	17%	24%	21%	20%	24%
Weather Change	18%	N/A	15%	17%	17%	24%	20%	19%	22%
Sci. Research	9%	N/A	14%	10%	9%	8%	11%	12%	10%
Gore Documentary	2%	N/A	<1%	<1%	<1%	<1%	<1%	<1%	0%
Media Coverage	15%	N/A	16%	14%	14%	12%	9%	8%	8%
Declining Species	<1%	N/A	N/A	1%	2%	2%	1%	<1%	<1%
Human Activity	4%	N/A	5%	9%	7%	9%	10%	12%	12%

Note: Asked only of respondents who indicated that they believed temperatures on Earth are increasing.

## The Impact of Superstorm Sandy

While the overall level of beliefs regarding climate change were largely unchanged between the pre- and post-Sandy fieldings during Fall 2012, the association between weather-related factors and views on the existence of climate change shifted significantly, as indicated in Table Seven. The NSEE includes a battery of questions that asks respondents to identify the relative impact of various factors on their belief that global warming is occurring. Comparisons of the pre- and post-Sandy iterations show significant changes in the connections that Americans are making between weather events like Superstorm Sandy and global warming. For instance, the percentage of survey respondents indicating that the strength of hurricanes striking the United States had a very large effect on their belief that global warming is happening rose by 16 percentage points between the pre- and post-Sandy surveys. Similarly, there was a 12-percentage point increase in the post-Sandy survey in relation to the pre-Sandy survey regarding the effect of extreme weather events such as severe storms and floods.

**Table 7**

“For each factor that I mention, please indicate if it has had a very large, somewhat large, not too large, or no effect on your view that the Earth is getting warmer.”

	Very Large		Somewhat Large		Not Too Large		No Effect		Not Sure	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Declining glaciers and polar ice throughout the globe	60%	51%	27%	36%	6%	6%	6%	5%	1%	2%
Computer models that indicate the earth is getting warmer	22%	20%	35%	31%	18%	20%	20%	19%	7%	11%
The strength of hurricanes hitting the United States	26%	42%	40%	33%	20%	15%	10%	7%	3%	3%
Reports from the Intergovernmental Panel on Climate Change	15%	12%	34%	27%	18%	18%	24%	26%	10%	16%
Milder winters in your area	34%	35%	33%	37%	17%	15%	14%	11%	2%	1%
Extreme weather events such as major storms and floods	33%	45%	42%	39%	13%	11%	9%	4%	2%	1%

Note: Asked only of respondents who indicated that they believed temperatures on earth are increasing, and organized by pre- and post-Sandy survey iterations respectively during early Fall and late Fall 2012.



## The Changing Face of Climate Change Doubters

Between Spring 2010 and late Fall 2012, the percentage of Americans who did not believe there was evidence of global warming fell from 36 percent to 22 percent, as shown in Table One. As many former doubters now believe that there is evidence of global warming, the remaining Americans who do not think that climate change is occurring identify different factors as the primary reason for their position. In Fall 2012, only about one out of five global warming doubters identified their personal observations as the primary factor that makes them believe temperatures on Earth are not increasing. The 19 percent mark found in the late Fall 2012 NSEE marked the lowest percentage of climate change skeptics who identified personal observations as the main reason they do not think global warming was occurring since the NSEE began in Fall 2008, as compared with a high of 43 percent in spring 2010, as reflected in Table Eight.

As personal observations have played less of a primary role in leading doubters to their position on global warming's existence, other factors have risen in importance. In the late Fall 2012 survey, one out of three doubters identified the existence of natural patterns as the primary reason that makes them believe global warming is not happening, making this the most commonly-cited factor, as shown in Table Eight. A middle-aged man from Houston, Texas, for example, stated that "we get cycles and it averages out," and an elderly woman from Marietta, Georgia stated that there have been "many centuries of weather patterns that follow the same path."

Another notable trend among the factors that doubters identify as the primary reason for their views on the existence of global warming is the rise of religious and political factors in 2012. In all three surveys in 2012, the percentage of climate doubters citing religious factors as the primary reason for their positions on global warming increased, with 11 percent of this group identifying this factor in both Fall 2012 NSEE surveys, as reflected in Table Eight. This represents an increase from three to four percent levels registered between Spring 2010 and Spring 2011. Examples from this category include a response from a middle-aged man in Detroit, Michigan who indicated that his "religious beliefs" leads him to conclude that global warming is not occurring, and another from a senior citizen from Newark, Ohio who identified the primary reason for his skepticism as "just my own Christian beliefs."

Those doubters citing political factors also increased markedly, jumping from one and two percent levels between Fall 2008 and Fall 2011 to nine percent in Spring 2012, a record 12 percent in early Fall 2012, and seven percent in late Fall 2012, as indicated by Table Eight. Among the responses that focused on political factors was one from a middle-aged man from Rutherford, New Jersey who stated that the primary reason he did not think there was evidence of global warming was that "it is all political garbage," and another from an elderly male Texan who stated that it was "a bunch of crap made up by Democrats."

Table 8

"What is the primary factor that makes you believe that temperatures on Earth are not increasing?"

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012 (Early)	Fall 2012 (Late)
Personal Observation	42%	N/A	43%	29%	40%	33%	20%	21%	19%
Natural Patterns	19%	N/A	22%	32%	29%	22%	21%	24%	33%
Lack of Evidence	11%	N/A	13%	7%	8%	14%	11%	12%	8%
Media has Misled	3%	N/A	2%	3%	2%	2%	4%	3%	1%
Evidence Disproves	8%	N/A	9%	9%	5%	6%	10%	7%	10%
Religious Factors	<1%	N/A	4%	3%	4%	8%	10%	11%	11%
Politically Driven	2%	N/A	<1%	2%	1%	<1%	9%	12%	7%
No Particular Reason	5%	N/A	4%	5%	3%	6%	6%	6%	4%
Not Sure/Other	9%	N/A	3%	10%	10%	11%	10%	5%	8%

Note: Asked only of respondents that indicated that there is not evidence of temperatures on Earth rising.

## Conclusion

The results of the Fall 2012 NSEE surveys provide evidence that there continues to be growth in the number of Americans who believe that global warming is occurring. The results both before and after Superstorm Sandy find that more Americans than at any time since Fall 2008 believe that temperatures on Earth are rising, and that confidence in this belief continues to grow. The NSEE results also continue to demonstrate that residents of the United States are linking their individual experiences with weather to their opinions on the existence of global warming. In the wake of Superstorm Sandy, American citizens are more closely connecting factors such as hurricanes and other severe weather episodes to increasing temperatures on Earth.

While evidence mounts that Americans are becoming more confident that global warming is occurring, there remains considerable uncertainty about what these shifts in opinion will mean in terms of governmental action. As the second term for the Obama Administration gets under way there are some indications that the president will be more aggressive in his efforts to address global warming than in his first four years in office, including major references to climate change in his 2013 Inaugural Address and the State of the Union Address. A number of climate policy options were also explored in the early Fall 2012 survey and were examined in a previous NSEE report (see <http://closup.umich.edu/national-surveys-on-energy-and-environment/1/nsee-public-opinion-on-climate-policy-options/>). Undoubtedly such efforts will be more likely if the growing levels of public belief in global warming remain constant and expand into the future.

## Methodology for the National Surveys on Energy and Environment (NSEE)

The National Surveys on Energy and Environment (NSEE) are designed, conducted and financed by the University of Michigan and Muhlenberg College. This research initiative began in the Fall of 2008 and was formerly known as the National Survey of American Public Opinion on Climate Change (NSAPOCC). This key findings report summarizes data collected in two telephone surveys of residents of the United States conducted during the Fall of 2012. The first survey was fielded between September 26th and October 11th, 2012. There were 561 interviews conducted by land line and 356 by cell phone. The survey had a margin of error of +/- 3.5% at a 95% level of confidence and an American Association of Public Opinion Research (AAPOR) RR3 response rate of 13%. The second survey was fielded between November 26th and December 5th, 2012. There were 709 interviews conducted by land line and 289 by cell phone. The survey had a margin of error of +/- 3% at a 95% level of confidence and an AAPOR RR3 response rate of 15%. Of the 998 completed surveys in the late Fall survey, 310 were conducted with respondents who were also interviewed in the early Fall survey. Percentages throughout the survey have been rounded upward at the .5 mark; thus, many totals in the results will not equal 100%. Interviews are conducted by personnel under the supervision of the Muhlenberg College Institute of Public Opinion in Allentown, Pennsylvania. The data has been weighted by the following categories: age, gender, educational attainment, race and region. The instrument was designed by Christopher Borick of Muhlenberg College and Barry Rabe of the University of Michigan.

Survey Iteration	Fielding Dates	Sample Size	Margin of Error
Fall 2008	September 8 - 24, 2008	603	+/-4%
Fall 2009	September 21 - October 20, 2009	988	+/-3%
Spring 2010	March 22 - April 9, 2010	726	+/-4%
Fall 2010	November 15 - December 9, 2010	916	+/-3.5%
Spring 2011	March 18 - April 5, 2011	712	+/-4%
Fall 2011	December 4 - 21, 2011	887	+/-3.5%
Spring 2012	March 27 - April 14, 2012	729	+/- 4%
Fall 2012 (Early)	September 26 - October 11, 2012	917	+/-3.5%
Fall 2012 (Late)	November 26 - December 5, 2012	998	+/3%

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